BLM

Sierra Front Field Office, Nevada

Pine Nut Herd Management Area

Final Summary of Current Conditions

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SECTION I. INTRODUCTION

1.1 Summary Purpose and Timeframe

This *Summary of Current Conditions* (Summary) assesses the factors affecting the Bureau of Land Management's (BLM) ability to achieve and maintain a thriving natural ecological balance and multiple-use relationship on the public lands and protect the range from the deterioration associated with an overpopulation of wild horses (*Equus callabus*). The goal within the Pine Nut Mountains Herd Management Area (HMA) is to manage a sustainable multiple use relationship between wild horses, wildlife and livestock by protecting the habitat for all uses. The monitoring of long-term vegetative trend began in 1974 and is on-going. This Summary takes into consideration resource management goals, objectives, natural resource conditions and trends. This Summary covers the period from the Final Multiple Use Decision (FMUD) (1995) which established stocking levels, use limits, and management objectives for wild horses and burros, livestock and wildlife to the present. In this Summary emphasis is placed on management and rangeland conditions from 2006 to 2016.

This Summary has been prepared because the BLM has determined that based on resource monitoring and wild horse population inventories, the Appropriate Management Level (AML) for wild horses may no longer be appropriate. The purpose of this Summary is to review the current conditions of the HMA, identify resources that are not meeting management objectives, determine the cause(s) of not meeting management objectives and identify solutions to correct the problems identified.

1.2 HMA Setting

The Project Area for this Summary is the Pine Nut Herd Management Area (HMA), which is located within the Pine Nut Mountains (Figures 1 and 2). The Pine Nut Mountains are located in Douglas, Lyon and Carson City counties, Nevada. The communities of Carson City, Minden, Gardnerville, Wellington, Smith and Dayton are spread around the edge of the Pine Nut Mountain range. The range, which runs north-south for 38 miles, includes approximately 397,899 acres of mixed ownership (public land, private land, and Indian trust land). The established boundary of the HMA encompasses approximately 90,900 acres of public lands and 14,692 acres of private lands. When the HMA was originally delineated, a large area was delineated around areas where wild horses resided in 1971, and in some cases the area included private lands, such as in the case along the northern edge of the HMA. In this document the terms "horse" and "wild horse" are used synonymously.

The topography of the range varies from rolling hills, approximately 5,000 feet in elevation, to over 9,000 feet in elevation at the tops of the tallest peaks. Vegetation is typical of the western Great Basin and is dominated by needlegrasses (*Achnatherum Spp*), Indian ricegrass (*Achnatherum hymenoides*), squirreltail (*Elymus elymoides*), sagebrush (*Artemisia sp*.), rabbitbrush (*Chrysothamnus viscidiflorus*), bitterbrush (*Purshia tridentata*), and pinyon-juniper woodlands (*Pinus monophylla-Juniperus osteosperma*). Temperatures can exceed 100 degrees Fahrenheit (°F) at lower elevations during July and August and can drop below 10 °F during December and January. Average annual precipitation is strongly influenced by elevation and varies from 6 to 14 inches.

1.3 Land Use Plan Objectives

The Wild Horse and Burro (WHB) and Wildlife (WLD) objectives in the Carson City Field Office Consolidated Resource Management Plan (CRMP) (BLM 2001) include the following:

- WHB-1, #2. "Remove excess wild horses from public land to preserve and maintain a thriving ecological balance and multiple-use relationship."
- WHB-2, Desired Outcomes #2 – "Maintain sound thriving populations of wild horses within herd management areas."
- WLD-2, Desired Outcomes #4 – "Maintain and improve wildlife habitat, including riparian/stream habitats, and reduce habitat conflicts while providing for other appropriate resource uses."
- WLD-2, Desired Outcomes #6 – "Maintain or improve the condition of the public rangelands so as to enhance productivity for all rangeland values (including wildlife)."

Greater sage-grouse (*Centrocercus urophasianus*) found within the Pine Nut Mountains are referred to as Bi-State sage-grouse. The *Greater Sage-Grouse Bi-State Distinct Population Segment Forest Plan Amendment, Final Environmental Impact Statement* has been prepared in order to conserve this population (USFS 2015). The Record of Decision for this land use plan amendment (LUPA) was issued on May 27, 2016 (BLM 2016a).

The LUPA outlines certain habitat conditions and restrictions on activities which would impact the management of wild horses in Bi-State habitats. Sage-grouse require specific habitat conditions, for example grass and other herbaceous cover is critical for nesting success. Desired habitat conditions for Bi-State sage-grouse are included in the LUPA and these habitat conditions would apply to Bi-State sage-grouse habitat in the Pine Nut Mountains (Figure 9). One objective included in this LUPA applies to managing wild horses:

> B-WHB-S-01: "Appropriate management levels in territories and herd management areas with habitat shall be based on the structure, condition, and composition of vegetation needed to achieve Bi-State DPS habitat objectives."

In the *Carson City District, Draft Resource Management Plan and Environmental Impact Statement* (BLM 2014a), the BLM has proposed the following management actions applicable to wild horses:

> Table 2-2, #200. Goal. "Manage healthy animals in balance with other uses and the productive capacity of their habitat within Herd Management Areas (HMAs)."
>
> Table 2-2, # 201, Objective. "Manage HMAs where habitat conditions (forage, water, cover, space) are adequate to support healthy populations and where a thriving natural ecological balances and multi-use relationship can be achieved and maintained."
>
> Table 2-2, #203, Action. "Manage wild horses and burros at identified AML range. When populations approach the upper AML level and monitoring data supports that excess animals are present, or would be present within the next foaling season, and need to be removed, gather wild horses and burros to reduce horse and burro numbers to the lower

limit of the AML range. The goal is to maintain the wild horses and burros population between the lower and the upper AML without exceeding the upper level.

- Frequency of gathers would be planned to conduct gathers before the high range of HML has been reached.
- HMA-specific population control programs would dictate type of gather and frequency of fertility control techniques. Possible control techniques may include contraceptive, sterilization, shewing sex ratios, and removal.
- Conflicts with home owners, private property owner, general public, and motorists would be minimized by gathering as soon as practical to provide for the safety of the public.
- Fencing may be used to protect the public."

Table 2-2, #204, Action. "Conduct gathers to remove excess wild horses and burros and implement population control programs. When feasible and appropriate, gather wild horses or burros that need to be removed from the range in response to drought emergencies."

Table 2-2, #205, Action.

- Through the Rangeland Health Evaluation or HMA Plan process, assess the adequacy of 4 habitat components (forage, water, cover, space) and capability of the HMA or metapopulation to support healthy wild horses and burros and healthy rangeland over the long term.
- Identify suitable, acceptable, marginal, and unsuitable habitat within portions of or entire HMAs through a modified habitat evaluation process and application of suitability criteria. Adjustments in AML may be necessary depending on habitat evaluations. Based on habitat evaluations, areas or HMAs maybe determined to be unsuitable for wild horses due to water quantity or distribution, sparse or inaccessible vegetation, or other factors. These areas would be excluded from AML determination.
- Adjust the habitat evaluation process as necessary to account for HMA- or population-specific information applicable to capability, suitability, and management of wild horses and burros in that area, and as information becomes available in the future.
- Conduct apportionment of forage for wild horses and burros and livestock on a case-by-case basis.
- Evaluate HMA designations and removal needs in regards to public safety along highways and urban areas.

Table 2-2, #206, Action. Manage wild horses and burros in a manner that ensures significant progress is made toward achieving the Standards and Guidelines for Rangeland Health and Wild Horses and Burros, and other site-specific or landscape-level objectives.

Table 2-2, #208, Action. Seek innovative solutions through a cooperative relationship with local communities and other organizations regarding wild horses and burros.

> Table 2-2, #212, Action. Complete carrying capacity analysis using Actual Use and Utilization data through Standards and Guidelines Evaluations and Rangeland Health Assessments. When evaluating AML and allocation of forage among rangeland users, assess the suitability of existing HMAs to sustain healthy, genetically diverse populations of wild horses and burros in balance with the thriving natural ecological balance of their habitat and other multiple uses. Balance management of HMAs in areas that provide sufficient resources for wild horse and burros with other resource uses and values.

A Record of Decision for this land use plan is not anticipated until spring 2017.

SECTION II. HMA HISTORY

2.1 Wild Horses

The BLM estimates that approximately 67,027 wild horses and burros reside on BLM-managed lands in the 10 Western states, based on the latest data available (BLM 2016). The combined AML is approximately 26,000 animals across 180 HMAs covering more than 31.9 million acres (14.7 million acres in Nevada).

After the passage of the Wild Free-Roaming Wild horses and Burros Act of 1971 (WFRHBA) (Public Law 92-195), the BLM established Herd Areas (HA) for BLM-managed lands with known populations of wild horses. HMAs were established later for those HA's through a land use planning process that established the initial and estimated herd size that could be managed while still preserving and maintaining a thriving natural ecological balance and multiple-use relationships for the area. To be designated as an HMA, an area must have four essential habitat components including: forage, water, cover and space (BLM 2010). For each HMA, the AML for wild horses or burros are established; no AML is established for areas outside of an HMA because those areas have not been established for the management of wild horse habitat.

In 1975, the earliest most reliable inventory of wild horses was completed, which identified an estimated 297 animals in the Pine Nut Mountains HA (the larger area which preceded designation of the HMA). In 1982 under the Reno Management Framework Plan (the land use plan in effect at the time), the BLM reduced the extent of the HMA to the current configuration of the HMA. The BLM removed from the HMA lands south of Sunrise Pass Road due to checkerboard ownership. In 1995, the FMUD established the AML for wild horses by individual grazing allotments within the HMA. The combined total AML for the HMA is between 119-179 animals. Gathers and removals of wild horses have continued since 1978. The most recent action occurred in December 2010, this effort was a gather and remove/fertility control treatment effort. Approximately 45 mares were gathered, treated with PZP-22 (a contraceptive which is effective for up to 22 months), freeze marked, and then released back to the HMA. Sixty-five excess wild horses that were residing outside the HMA were removed during this gather (BLM 2010a). Table 1 lists the population inventories and horse removals in the Pine Nut Mountains since 2000.

The most recent inventory was conducted April 2016. During the inventory, 536 wild horses were observed in the Pine Nut Mountains (Figure 9). Between 2012 and 2016 the wild horse population inside and outside of the HMA has increased an average of 17 percent per year. Horses outside of the HMA were included in this calculation as some of the horses move between the HMA and areas outside of the HMA.

Table 1. Population Inventory/Horse Removals Since 2000.

Year	Action	Number of Horses*
2000	Removal	40 nuisance horses outside the HMA, Fish Springs area
2000	Population Inventory	329
2000	Removal	40 nuisance horses outside of the HMA, Dayton
2003	Removal	232 horses inside and outside HMA
2003	Population Inventory	118
2006	Removal	25 nuisance horses outside the HMA, Fish Springs area and Dayton
2007	Removal	14 nuisance horses outside the HMA, Fish Springs area
2008	Removal	2 nuisance horses outside the HMA
2008	Population Inventory	177
2009	Removal	10 nuisance horses outside the HMA, Fish Springs area
2010	Population Inventory	206
2010	Removal	46 excess horses removed from outside the HMA; 43 mares treated with Porcine Zona Pellucida (PZP-22) and returned to the HMA
2011	Removal	4 aggressive stallions, Carson City
2012	Removal	2 aggressive stallions, Carson City
2012	Population Inventory	293, 228 inside the HMA
2012	Removal	1 injured horse, 7 nuisance horses Dayton and Minden
2013	Removal	19 (13 nuisance and 6 aggressive horses) outside the HMA, Carson City and Fish Spring areas
2014	Removal	6 nuisance horses, Gardnerville
2014	Population Inventory	280 total of which 157 were inside and 123 were outside of the HMA
2015	Population Estimate	336, based on 2014 inventory, 188 inside the HMA, 148 outside the HMA
2016	Population Estimate	536, 2016 inventory raw data, 325 inside the HMA, 211 outside the HMA**

* Removal of nuisance/aggressive horses is in response to complaints from private land owners, or to provide for public safety.

** Recent March inventory, this raw data will be analyzed by a statistician for the final estimate which is typically 10 percent greater than the number of horses directly observed. During the 2014 inventory it was determined that many horses were missed because they had moved into the forested areas.

Source: Modified from BLM 2014a.

The allocation of forage for wildlife, wild horses, and livestock was established through a FMUD, which established the total Animal Unit Months (AUMs) for each category based on monitoring data. One AUM is the amount of forage required by an animal unit (AU) for one month. The FMUD for the Pine Nut Mountains HMA and nine overlapping grazing allotments was approved in 1995 (Figure 3; BLM 1995).

The AML is the range within which a wild horse population can be maintained while achieving a thriving natural ecological balance and multiple use relationship for the long-term based on habitat suitability and monitoring data. The cumulative AML for the HMA was established as a range between 119-179 animals. Because areas outside the HMA are not managed for wild horses, no AML was established for areas outside the established HMA boundary. Available forage is measured in AUMs, Table 2 lists the wild horse AML range and associated number of AUMs by grazing allotment within the HMA.

Table 2. Wild Horse AML by Grazing Allotment.

Grazing Allotment Name	% of Allotment in HMA	Wild Horse AML	Wild Horse AUMs
Buckeye	12	27 – 41	493
Churchill Canyon	18	9 – 13	154
Clifton	77	24 – 37	444
Eldorado Canyon	79	15 – 22	270
Hackett Canyon	88	10 – 15	187
Mill Canyon	43	17 – 25	296
Rawe Peak	100	3 – 5	54
Sand Canyon	85	5 – 8	95
Sunrise	97	9 – 13	159
Total		**119 - 179**	**2,152**

Sources: 1995 MUD, BLM 2010.

SECTION III. GRAZING

3.1 Livestock Use

Historically, livestock grazing has occurred in the Pine Nut Mountains since the 1930s under BLM permitting through the Taylor Grazing Act, although sheep and/or cattle grazing are likely to have been occurring in the area since the late 1800s. The HMA overlaps with nine livestock grazing allotments (Figure 3). Areas that are "available" for livestock grazing are determined through a land use plan. Authorization of AUM's, range improvements, season of use etc. is made through a term livestock grazing permit process that includes analysis under the National Environmental Policy Act (NEPA) and public involvement. Table 3 lists the allotment name, season of use, AUMs, and type of use (cattle or sheep) in the HMA.

Wild horses have essentially unrestricted access to all nine grazing allotments within the HMA, however, several allotments are rarely used by horses. Livestock are permitted in four allotments, but three of these allotments are in non-use for the 2015 grazing year. One grazing allotment had active grazing during the 2015 grazing year. Five allotments have no permitted livestock use.

Table 3. Grazing Allotments in the HMA.

Grazing Allotment Name	% of the Allotment in the HMA	Kind of Livestock	Permitted AUMS by Allotment	Permitted Seasons of Use
Buckeye	12	Cattle	1,471	4/1 to 9/15
Churchill Canyon	18	Cattle	1,236	11/1 to 5/15
Clifton	77	No permitted use	-	-
Eldorado Canyon	79	No permitted use	-	-
Hackett Canyon	88	Cattle Sheep	146 39	3/15 to 6/30 3/15 to 6/30
Mill Canyon	43	No permitted use	-	-
Rawe Peak	100	No permitted use	-	-
Sand Canyon	85	No permitted use	-	-
Sunrise	97	Cattle	159	3/15 to 6/15

3.2 Wild Horse and Livestock Use

For the 2013 and 2014 grazing years, livestock use only occurred within the Churchill Canyon and Sunrise Pass portions of the HMA. For the past 10-years livestock use has only occurred in two of the nine grazing allotments within the HMA. For some of the Allotments livestock grazing has not occurred for over 20-years. Table 4 lists the allotments within the HMA, and actual use during the past 10-years. Actual livestock use is obtained from Actual Use Statements and wild horse use is based on inventory information. Based on inventory data, the wild horses within the Pine Nut Mountains increased at 17 percent per year from 2012 to 2016. Because some of the wild horses move in and out of the HMA and between allotments the 17 percent figure is for all wild horses within the Pine Nuts.

Table 4. Comparison of Livestock and Wild Horse Actual Use (in AUMs) from 2006 to 2016.

Year	Buckeye		Clifton		Churchill Canyon		Eldorado Canyon		Hackett Canyon		Mill Canyon		Rawe Peak		Sand Canyon		Sunrise	
	Livestock/Horse		Livestock	Horse	Livestock	Horse	Livestock	Horse	Livestock	Horse	Livestock	Horse	Livestock	Horse	Livestock	Horse	Livestock	Horse
2006-07	0	0	0	233	141	175	0	117	0	417	0	0	0	0	0	75	162	0
2007-08	0	0	0	280	186	210	0	140	0	500	0	0	0	0	0	90	160	0
2008-09	0	**0**	0	**336**	189	**252**	0	**168**	0	**600**	0	**0**	0	**0**	0	**108**	159	**0**
2009-10	0	0	0	456	200	126	0	558	0	300	0	6	0	0	0	54	163	0
2010-11	0	**0**	0	**576**	200	**0**	0	**948**	0	**0**	0	**12**	0	**0**	0	**0**	158	**0**
2011-12	0	0	0	792	200	0	0	1,092	0	60	0	192	0	0	0	0	147	0
2012-13	0	**0**	0	**888**	200	**0**	0	**1,092**	0	**120**	0	**456**	0	**0**	0	**0**	159	**0**
2013-14	0	60	0	1,039	200	0	0	1,198	0	140	0	528	0	72	0	0	141	0
2014-15*	0	60	0	1,419	200	0	0	1,109	0	209	0	564	0	72	0	0	131	0
2015-16	0	**0**	0	**1,800**	0	**72**	0	**1,044**	0	**252**	0	240	0	**0**	0	**48**	0	**0**

Based on a grazing year of March 1 to February 28.

*Many horses were missed during the 2014 inventory the results are not presented in this table.

AUMs in **bold** represent a year in which a horse inventory was conducted; AUMs not in bold are estimates based on inventory years.

For some allotments horse numbers vary widely between years, due to horses moving between allotments and outside of the HMA

From 2012 to 2016 the overall population for the Pine Nut Mountains increased at 17 percent annually.

SECTION IV. HMA PROFILE

4.1 Utilization

Utilization refers to the proportion (usually percentage) of the current years forage production that is consumed and or destroyed by grazing animals. Recommended utilization levels depend upon how fully each forage species in the plant community can be defoliated and still maintain or improve in vigor. Proper use refers to the maximum degree of use by grazing, expressed as a percent deemed to be physiologically correct from the standpoint of plant vigor, reproduction, longevity and regrowth potential. The FMUD established stocking levels for both wild horses and livestock based on the amount of available forage. Livestock grazing seasons were modified to reduce the number of grazing animals during vegetative growth and reproductive periods. Perennial grass species are most vulnerable to grazing pressure during the spring growing season when the plants are relaying on root reserves to produce leaves. Long-term grazing management also needs to be at sufficiently low enough levels to allow palatable plant species opportunities to reproduce and young plants time to become established. Many factors influence forage use levels and animal distribution patterns such as topography, distance from water, plant community characteristics, type of livestock, weather and fencing.

As shown in Table 9, the average wild horse use of perennial grass species in the Clifton, Eldorado Canyon, Hackett Canyon and Mill Canyon allotments were 81, 78, 76 and 69 percent respectively for the past three grazing years for Clifton and Eldorado and two years for Hackett Canyon and Mill Canyon. High grazing use levels have contributed to the loss of native bunch grass plants and decreased the amount of available forage (see photos in Appendix D). The FMUD stated the importance of sage-grouse habitat in the Mill Canyon Allotment and indicated no livestock grazing would occur during the spring to eliminate competition for forage between livestock, wild horses and sage-grouse during this critical time for vegetative growth and sage-grouse reproduction. No livestock grazing has occurred within the Mill Canyon Allotment but wild horse use has exceeded the combined use limit established in the FMUD for both livestock and wild horses. With the exception of sheep trialing through Eldorado Canyon for approximately one week each year, no livestock grazing has occurred within the Eldorado Canyon, Hackett Canyon and Clifton allotments but the combined use limit of 55 percent has been exceeded by wild horse grazing alone. A utilization rate of 30-40 percent is recommended for ranges in poor condition and during drought (Holecheck 2004).

Years of overgrazing from wild horses in the Clifton, Eldorado Canyon, Hackett Canyon, and Mill Canyon allotments has reduced the amount of forage these areas can produce, thereby reducing the number of grazing animals that can be supported. Overgrazing leads to the loss of palatable forage species and in many cases the palatable species are replaced by less palatable or unpalatable species. Native desert bunch grasses are slow to recover from major disturbances; it can take decades of little or no grazing for overgrazed ranges to recover. Palatable forage grasses are not only important to wild horses and livestock but also to many other species of wildlife including rodents which provide essential food for raptors, foxes, coyotes and many other carnivores.

Wild horses and their use is not distributed evenly throughout the HMA. Horses have only been identified five out of the past 10-years in the Sand Canyon Allotment, and have not been

identified at all in the Sunrise Allotment within the past 10-years (Table 9). This indicates that few horses use this part of the HMA. BLM inventory techniques are not sensitive enough to always identify small numbers of horses, especially in areas of extensive tree cover. However, little or no horse use is currently occurring within these areas. Water is available within the Sand Canyon Allotment, however reliable permanent water is not available within the Sunrise Allotment portion of the HMA. Water availability and distance from suitable grazing areas is likely the primary factor influencing horse distribution but other unknown factors may also influence distribution. Horses commonly move between Hackett Canyon and Eldorado Canyon allotments, as most horses utilizing the Hackett Canyon obtain water in the Eldorado Canyon Allotment.

Tables 5 through 8, show the number of horses and the percent use on the forage plants. When possible key forage grass species are sampled, however, due to sustained overuse in some cases no or insufficient numbers of key grass species were present, *Poa* or squirreltail were sampled instead.

In some cases the recorded use did not increase as the horse numbers increased, because at high use levels very little grass remains on the key species. When the key species are grazed to the upper heavy use and severe use levels, non-key (preferred) species are used to a greater degree as it is difficult for horses to graze much more on the key species. This switching to non-key species reduces the apparent increase of utilization. Because of water distribution and the Eldorado Canyon Allotment situated between Clifton and Hackett Canyon allotments, horses frequently move between these allotments.

Table 5. Percent Use for the Clifton Allotment Portion of the HMA.

Year*	Horse Number	Percent Use
2011	66	76*
2012	74	65
2013	86	80*
2014	118	83
2015	150	79

*Based on BLM grazing year March 1 to February 28, i.e. the 2015 grazing year ends March 2016.
***Poa*, could not find any Key Species

Table 6. Percent Use for the Eldorado Canyon Allotment Portion of the HMA.

Year*	Horse Number	Percent Use
2011	91	79***
2012	91	45***
2013	100	85
2014	92	69**
2015	87	79**

*Based on BLM grazing year March 1 to February 28, i.e. the 2015 grazing year ends March 2016.
**Squirrel tail was used on some transects because of insufficient key species.
****Poa* was the only species found, key species were not present
Horses move between Eldorado Canyon, Hackett Canyon and Clifton Allotments.

Table 7. Percent Use for the Hackett Canyon Allotment Portion of the HMA.

Year*	Horse Number	Percent Use
2011	5	ND
2012	10	ND
2013	12	ND
2014	17	78
2015	21	73***

*Based on BLM grazing year March 1 to February 28, i.e. the 2015 grazing year ends March 2016.

***Squirrel tail was the only species found, key species were not present.

ND – No Data

Table 8. Percent Use for the Mill Canyon Allotment Portion of the HMA.

Year*	Horse Number	Percent Use
2011	16	ND
2012	38	11
2013	44	ND
2014	47	64
2015	20	73

*Based on BLM grazing year March 1 to February 28, i.e. the 2015 grazing year ends March 2016.

**Squirrel tail was used on some transects because of insufficient key species.

****Poa* was the only species found, key species were not present

ND – No Data

On many transects key species could not be found or the number of key perennial plants were too few for analysis. Decades of overgrazing has led to the loss of key species. Rest from grazing and/or reduced grazing (slight/light utilization) is recommended to enable key plant species to recover. If livestock are not placed on the Clifton, Eldorado Canyon, Hackett Canyon and Mill Canyon allotments and wild horses are managed at the levels set in the FMUD by allotment, key species would be expected to begin recovering.

The limited amount of available surface water currently results in stress to the horses during the summer months. Horses are forced to wait hours at seeps and small springs to obtain water. By reducing the number of wild horses to the levels set in the FMUD by allotment, the amount of available water per horse will increase lessening the impact to individual horses.

In Table 9, the combined horse numbers for 2013-14, 2014-15, and 2015-16 grazing years were averaged as well as utilization levels.

Table 9. Combined Grazing Use.

Allotment	Allocated AUMs Livestock	Allocated AUMs Horse	AML based on 1995 MUD	Horse AUMs	Use by Livestock (AUMs)	Utilization Level
Buckeye	176	493	27 - 41	40	0	No Use*
Churchill Canyon	230	154	9 - 13	24	200	No Use*
Clifton	472	444	24 - 37	1,419	0	81% (Severe)
Eldorado Canyon	213	270	15 - 22	1,117	0	78% (Heavy)
Hackett Canyon	165	187	10 - 15	200	0	76% (Heavy)*
Mill Canyon	881	296	17 - 25	444	0	69% (Heavy)*
Rawe Peak	54	54	3 - 5	48	0	5% (Slight)*
Sand Canyon	N/A	95	5 - 8	16	0	No Use*
Sunrise	154	159	9 - 13	0	136	No Use*
Total	2,345	2,152	119-179	3,308	-	-

Hackett Canyon sustained heavy use though the table only shows an average of 200 AUMs, Hackett Canyon adjoins Eldorado Canyon and during the population inventories the horses were on Eldorado Canyon Allotment
No Use – no detectible use.
*Utilization was not collected for these portions of the HMA for the 2013 grazing year.

4.2 Precipitation

Data from two remote automated weather stations (RAWS) located in Fish Springs and Mt. Como, Nevada are being used for this Summary. Data from Mt. Como is incomplete over the Summary period and was used as supplemental precipitation data to correlate precipitation patterns with Fish Springs data. Data from Fish Springs is complete and relevant for lower elevations. Below are the locations and elevations of the two weather stations:

- Fish Springs - Latitude, 38˚ 56’ 10” Longitude, 119 ˚ 39’ 07” Elevation 5,120 feet
- Mt. Como - Latitude 39˚ 01’ 38” Longitude 119˚ 25’ 52” Elevation 7,000 feet

Data from Fish Springs will be used to analyze precipitation in the Project Area since it is the most complete. Annual precipitation data includes precipitation falling from October through September (the water year). Annual precipitation in the Pine Nut Mountains for 5,000-8,000 feet elevation is four to eight inches. Table 10 shows the precipitation for Fish Springs for the analysis years as a percentage of average precipitation.

Table 10. Fish Springs Data.

Year	Precipitation (in Inches)	Percent of Average Precipitation
2004	5.59	93
2005	7.01	117
2006	10.27	171
2007	2.72	45
2008	3.9	65
2009	7.26	121
2010	13.46	224
2011	4.18	7
2012	5.23	87
2013	2.06	34
2014	6.77	113

4.3 Vegetation Communities

The Pine Nut Mountains supports a diversity of vegetation communities that may be generalized into three categories: pinyon-juniper woodlands, sagebrush, and cold desert scrub (shrubland) (Figure 5). These different vegetation communities are a result of elevation, moisture, soil substrate, aspect, and past land use practices.

Pinyon-Juniper Woodlands This is largest vegetation community found in the Pine Nut Mountains. The distribution of single-leaf pinyon is primarily a function of climate and begins abruptly at the Truckee River and Interstate 80 and increases in dominance southward. Throughout its distribution, single-leaf pinyon mixes with Utah juniper, which is the most common juniper species in the Pine Nut Mountains. Western juniper (*Juniperus occidentalis*) also occurs in the Pine Nut Mountains, although to a lesser extent.

Pinyon-juniper forests thrive in areas where annual precipitation ranges from 12 to 18 inches but will survive to lower extremes of eight inches as in the Pine Nut Mountains. Elevation limits are determined at the lower extent by lack of moisture and at the upper limits by biotic competition, low temperatures, and excessive soil moisture. Within the Pine Nut Mountains, pinyon-juniper woodlands occupy elevations from about 5,000 to 7,000 feet.

Sagebrush The sagebrush community is found throughout the Pine Nut Mountains at all elevations and aspects. This community is divided into two subgroups, big sagebrush and low sagebrush. The big sagebrush community includes three subspecies: the more common Wyoming sagebrush, which grows in dry, low elevation areas; mountain sagebrush, which grows in more moist areas and at higher elevations; and basin big sagebrush, which grows at the lowest elevation of the three subspecies. Plants associated with big sagebrush include other shrub species, grasses, and forbs. The low sagebrush community may include both low sagebrush and black sagebrush. Low sagebrush grows in colder, higher elevation sites with thin rocky soils, but may occupy areas similar to Wyoming big sagebrush and may intermix with this subspecies at the transition area between two adjacent ecological communities. Black sagebrush grows in similar conditions but prefers more moisture (Mozingo 1987), and this species is limited in range within the Pine Nut Mountains. Other constituents within the low sagebrush community include buckwheat species (*Eriogonum spp.*), lomatium (*Lomatium spp.*), lewisia (*Lewisia spp.*), balsamroot (*Balsamorhiza spp.*), and grasses.

Shrubland Several different species assemblages are included in the cold desert scrub vegetative community; however, the most common are detailed below:

Inter-Mountain Basins Semi-Desert Shrub-Steppe—This system occurs at lower elevation on alluvial fans and flats with moderate to deep soils. This system is dominated by grasses, with an open shrub layer. The most typical grasses include Indian ricegrass, needle and thread grass (*Hesperostipa comata*), and Sandberg's bluegrass (*Poa secunda*). Shrubs present include fourwing saltbush (*Atriplex canescens*), rabbitbrush, Mormon tea (*Ephedra spp.*), and winterfat (*Krascheninnikovia lanata*). Although big sagebrush may be present, it will not be a dominant component of this system. This system is open and spotty, with uneven distribution of vegetation.

Inter-Mountain Basins Mixed Salt Desert Scrub—This system is extensive and is found in saline basins, alluvial slopes, and plains. This system experiences very low amounts of annual precipitation and has very open canopies. Shrub species often present include an Atriplex component, such as shadscale or fourwing saltbush. Other shrubs present include Wyoming big sagebrush (*Artemisia tridentata spp. wyomingensis*), rabbitbrush, Mormon tea, spiny hopsage (*Grayia spinosa*), and winterfat. The herbaceous layer varies greatly, being quite sparse in some areas and fairly dense in other areas. Grasses commonly include: Indian ricegrass, thickspike wheatgrass (*Elymus lanceolatus ssp. lanceolatus*), western wheatgrass (*Pascopyrum smithii*), and Sandberg's bluegrass.

Inter-Mountain Basins Greasewood Flat—This system occurs on stream terraces and flats or may form rings around more sparsely vegetated playas. The soils are typically saline, with a shallow water table and intermittent flooding. Although these sites dry out during the growing season, the water table remains high enough to maintain vegetation despite the salt accumulations. The shrub canopy is often open to moderately dense, with such shrubs as: greasewood (*Sarcobatus vermiculatus*), fourwing saltbush, shadscale, and winterfat. The grass component includes alkali sacaton (*Sporobolus airoides*), saltgrass (*Distichlis spicata*), and some amount of basin wildrye (*Leymus cinereus*).

4.4 Vegetation Trend

Trends in vegetative attributes have been monitored at 18 key areas, utilizing frequency and photo trend plot methodologies. "Frequency" is the percentage of possible plots within a sampled area occupied by a target species. It is insensitive to the size or number of individual plants. The vegetation attributes monitored with frequency methods include frequency, basal cover and general cover categories (including litter), and reproduction of key species (if seedling data are collected). Frequency is a very useful monitoring method but does not express species composition, only species presence. With this method you don't make species counts-you are only concerned with whether the target species is present or absent within each quadrat. Frequency is an index that integrates species' density and spatial patterns. There are three methods of collecting frequency data and all three consist of observing quadrats along transects, with quadrats systematically located at specified intervals along each transect. These include pace, quadrat and nested frequency. The only differences in these techniques are the size and configuration of the quadrat frames and the layout of the transect. The nested frequency technique was used. Photo plots are close-up photographs taken to provide a qualitative record of condition from year to year within a defined small area (plot). Photographs are taken from the same location and same specified height each time, providing both a permanent visual record of the past and a means to evaluate changes over time. Photo plots typically involve placing a standard-sized frame on the ground.

Monitoring locations (plots) were established to determine vegetative trends (Figure 7). Records were compiled for trend plots from 1974 to 2015 (Appendix A). Photo trend plots were re-read in 2015. The trends for upland plant communities were primarily static to downward with the exception of two plots in the Buckeye and Churchill Canyon allotments. Some indicators of a downward trend are: 1) a reduction in the number of native perennial plant species; 2) an increase in invasive plant species; and 3) signs of soil disturbance and/or loss. Several factors influence the condition of plant communities including wild horse grazing, livestock grazing, drought, fire and plant community dynamics such as the expansion of pinyon-juniper woodlands.

Wild horse grazing is a contributing factor to the downward trends in upland vegetation communities within the Clifton, Eldorado Canyon, Hackett Canyon and Mill Canyon allotments. Plant species palatable to horses and livestock have declined through time and wild horse utilization of perennial grass species has exceeded recommended use levels. No livestock use has occurred within this portion of the HMA. The FMUD reduced livestock and wild horse numbers and established a utilization standard of 55 percent which applied to the combined use of both wild horses and livestock. No livestock grazing has been permitted in these allotments, however, because wild horse numbers have exceeded AML, the utilization standard of 55 percent has not been achieved (see photos in Appendix D). Hackett Canyon has an active grazing permit, however, the permittee has taken non-use, the other three allotments do not have active grazing permits however, individuals have expressed interest in obtaining permits for grazing in these allotments.

Buckeye

Vegetative trend within the portion of the HMA in the Buckeye Allotment was static to upward. Due to downward trends in 1993, the FMUD prohibited livestock use within the HMA during the vegetative growing season (April 1- July 15). A new livestock grazing permit was issued in 2006 which changed the kind of livestock, reduced the number of permitted livestock AUMs and removed the seasonal livestock use restriction within the HMA. However, livestock have not used the portion of the allotment within the HMA since 2006. Wild horse use within this portion of the HMA since 2006, was calculated from inventory data at 60 AUMs during 2013-2014. The AML for the Buckeye portion of the HMA is 493 AUMs. Because current grazing use has been below three percent on upland vegetation, and the number of perennial grass plants remained static and increased at the monitoring locations between 2004 and 2015 current grazing is not negatively impacting plant community dynamics.

Churchill Canyon

Vegetative trend within the Churchill Canyon portion of the HMA is static to upward. Livestock use from 2005 to 2014 averaged 191 AUMs per year. No livestock use occurred in 2015. Wild horse use estimated from inventory data between 2006 and 2009 also averaged 191 AUMs per year. No wild horse use was recorded from 2010 to 2014. Perennial grass numbers declined from three in 2007 to two in 2015 but there was a species shift toward more palatable and desirable needlegrass species from Sandberg's bluegrass. Due to its higher palatability to livestock and wild horses, establishment of needlegrass indicates grazing is not currently negatively influencing the plant dynamics at this site.

Clifton

Vegetative trend within the Clifton portion of the HMA is static to downward. No livestock use is permitted or has occurred in this portion of the HMA since prior to 1988. Wild horse use estimated from inventory data has increased from 233 AUMs in 2006 to 1,800 AUMs in 2016. The highest recorded wild horse use during this time period was 1,800 AUMs in 2016. Wild horses move between allotments within the HMA and outside of the HMA. Overall the wild horse population within the Pine Nut Mountains increases 17 percent annually. The AML for the Clifton portion of the HMA is 444 AUMs. The FMUD indicated the amount and concentration of grazing use was resulting in the loss of grass plants in the mid and lower elevations of the allotment. Use of vegetation by wild horses has exceeded the combined recommended use for both livestock and wild horses. Because current wild horse grazing use was 81 percent and palatable perennial grasses declined between 1980 and 2015, horse use has been identified as a causal factor in the recent downward trend.

Eldorado Canyon

Vegetative trend within the Eldorado Canyon portion of the HMA is downward. With the exception of sheep trailing for approximately one week every year, no livestock use has occurred in this portion of the HMA since prior to 1982. Based on inventory data wild horse use increased from 117 AUMs in 2006 to 1,044 AUMs in 2016. The highest recorded wild horse use during this time period was 1,248 AUMs in 2012. The AML for the Eldorado Canyon portion of the HMA is 270 AUMs. Use of vegetation by wild horses has exceeded the combined recommended use for both livestock and wild horses. Because current wild horse grazing use was 79 percent and the number of perennial grasses is declining, horse use has been identified as a causal factor in the recent downward trend.

Hackett Canyon

Vegetative trend within the portion of the HMA in the Hackett Canyon Allotment is static to downward. Livestock use is permitted but has not occurred since prior to 1988. Based on inventory data, estimated wild horse use decreased from 417 AUMs in 2006 to 252 AUMs in 2016. The highest recorded wild horse use was 600 AUMs in 2008. Only 21 horses were recorded in the Hackett Canyon Allotment on the day of the 2016 inventory, wild horse utilization data indicates wild horses have been utilizing the Allotment. Wild horse use was 73 percent during the 2015-2016 grazing year, palatable perennial grass numbers remained static at one monitoring location and declined at the other location. The overall number of perennial grasses at the second location increased from four plants in 1980 to seven plants in 2015, but there was a species shift from Thurber's needlegrass (more palatable – deep rooted) to Sandberg's bluegrass (less palatable – shallow rooted). Wild horse use has been identified as a causal factor in the recent downward trend.

Mill Canyon

Vegetative trend within the portion of the HMA in the Mill Canyon Allotment is downward. Livestock use is not permitted in Mill Canyon and the last livestock use occurred in 1996. Wild horse use estimated from inventory data increased from six AUMs in 2006 to 444 AUMs in 2016. Because current wild horse grazing use was 73 percent within the allotment (Table 9) and there was a decline in the number of perennial grass species at two monitoring plots and a shift from palatable (Thurber's needlegrass) to less palatable grass species (bottlebrush squirreltail) at one monitoring plot between 1980 and 2015. Wild horse use has been identified as a causal factor in the recent downward trend.

Rawe Peak

Vegetative trend within the portion of the HMA in the Rawe Peak Allotment is downward. Livestock use is not permitted within this allotment and no livestock use has occurred since prior to 1988. Wild horse use estimated from inventory data was 72 AUMs in 2013-2014. Because current grazing use was five percent on upland vegetation and perennial grass species did not decline at one plot and increased at the other plot between 1980 and 2015, current grazing has been determined to not be a causal factor in the recent downward trend. The photo record for this site shows an increasing density and size of pinyon and juniper trees between 1976 and 2015. The site is trending toward a tree state. Considering the long-term decrease in the number of perennial grasses and shrubs, a shift toward less desirable grass species and the increase in tree densities, the trend is rated as downward.

Sand Canyon

Vegetative trend within the portion of the HMA in the Sand Canyon Allotment is static to upward. There is no permitted livestock use within the allotment and livestock use has not occurred since prior to 1988. Wild horse use estimated from inventory data ranged from 54 to 108 AUMs from 2006 through 2009 and utilization was less than three percent.

One frequency transect was established in 1982 within the Sand Canyon Allotment. The data comparison from 1982 to 2015 showed no change in the percent frequency of desert needlegrass for key area 1. However, bottlebrush squirreltail has decreased from 41 percent in 1982 to 14 percent in 2015. Sandberg's bluegrass has increased from 26 percent to 37 percent in 2015.

Because current grazing use has been below three percent on upland vegetation and palatable perennial grass species increased and the total number of grasses increased at two of the three monitoring plots, current grazing has been determined to not be a causal factor in the recent downward trend. The results within Sand Canyon Allotment were mixed for the time period 1980 to 2015, there was a species shift toward less desirable species at two locations but there was also an increase in the number of grasses at two locations, which suggests declining condition early in the time period and recovery later.

Sunrise

The vegetative trend within the Sunrise Allotment portion of the HMA is static. Livestock use estimated from inventory data was from 106 to 163 AUMs from 2006 until 2014. No livestock use occurred in 2015. The FMUD specifically stated that livestock use would not be authorized until utilization levels by wild horses were below the allowable use levels for grasses and/or bitterbrush. There is no recorded wild horse use in this area for the time period from 2006 through 2014. Current grazing use has been below three percent on upland vegetation and grass seedlings were establishing at one plot and there was no change in the number of perennial grasses between 1980 and 2015 at the other plot. The overall trend in the Sunrise Allotment is static.

4.5 BLM Sensitive Species (Plants)

Table 11 lists the sensitive plant species that occur or their habitat may occur in the HMA. A brief description of each plant species and potential threats is provided below.

Table 11. List of Sensitive Plant Species.

Common Name	Scientific Name
Churchill narrows buckwheat	*Erigonium diatomaceum*
Lavin's eggvetch	*Astragalus oophorus var. lavinii*
Margaret's rushy milkvetch	*A. convallarius var. margaretiae*
Pine Nut Mountains mousetails	*Ivesia pityocharis*
Sand cholla	*Grusonia pulchella*
Tiehm's peppercress	*Stroganowia tiehmiil*
William's combleaf	*Polyctenium williamsiae*

Lavin's milkvetch is a perennial herb that has been found at elevations of 5,700 to 7,467 feet. Lavin's milkvetch grows in soil typically on northeast to southeast facing slopes, badlands, small hills, or slopes that are dry, open, and barren containing gravel with clay originating from volcanic ash or carbonate (BLM 2014a).

Milkvetch species typically have toxins in the above ground biomass that make them unattractive to grazing. While some grazing may occur, the plant is naturally protected by the toxins it produces. The current on-going drought is thought to limit growth and the production of seed.

Margaret rushy milkvetch is endemic to the Pine Nut Mountains. It typically grows at an elevation of 4,700 to 7,800 feet in rocky soils on slopes and flats in mixed pinyon-juniper and sagebrush landscapes (BLM 2014a).

Sand cholla is a stem-succulent, spiny shrub with magenta flowers. It grows in sand on dunes, well-drained slopes, flats, and borders of dry lakes and washes in desert or sagebrush scrub from 3,950 to 6,300 feet in elevation in western and central Nevada (BLM 2014a).

The long slender spines on the cholla afford adequate protection against grazing. The current on-going drought is thought to limit growth and the production of seed.

Tiehm peppercress occurs in the foothill and low mountain regions of the Pine Nut Mountains including Table Mountain in Lyon County. Populations occur in both high and low elevation in

basaltic or sedimentary rocks and at the fringes of rocky scree or talus piles, clay soil, and the base of rock outcrops. It grows in association with shadscale, bitterbrush, sagebrush, and rarely, Utah juniper (BLM 2014a).

The plant typically grows along the margins of talus piles and in very rocky areas. The current on-going drought is thought to limit growth and the production of seed.

Williams combleaf is a small perennial facultative herb in Washoe, Lyon, Douglas, and Nye counties. It grows along the margins of seasonal lakes perched over volcanic bedrock in sagebrush, pinyon-juniper, and mountain sagebrush zones (BLM 2014a).

Playa lake water is critical in saturating shoreline soils where the species occurs. This water also drowns out competitor upland species, preventing them from establishing on the shorelines. The current on-going drought is thought to limit growth and the production of seed.

4.6 Noxious and Invasive Weeds

Invasive species are defined by Executive Order 13112 as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." Alien refers to a species that did not evolve in the environment in which it is found. This includes plants, animals, and microorganisms. Table 12 lists the noxious weeds that may be present in the HMA. A brief description of each is provided below.

Table 12. List of Noxious Weeds.

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Hoary cress	*Cardaria draba*
Perennial pepperweed	*Lepidium latifolium*
Poison hemlock	*Conium maculatum*
Medusahead	*Taeniatherum caput-medusae*
Musk thistle	*Carduus natans*
Scotch thistle	*Onopordum acanthium*
Spotted knapweed	*Centaureau biebersteinii*

Canada thistle is a perennial weed that has a deep, extensive creeping root system. This weed reproduces by both roots and seeds. This weed is often found in patches or colonies due to the spreading root system and grows best in moist areas and is also found in pastures. Hoary cress is a perennial weed that grows best in disturbed, alkaline soils. This weed reproduces through roots and seed. Perennial pepperweed/tall whitetop is a perennial weed that has a creeping root system and can be found in moist areas and pastures. Poison hemlock is a biennial weed that has a thick, deep taproot. It reproduces by seed and is highly toxic to animals and humans when consumed.

Medusahead is an annual weed that reproduces by seed and is unpalatable to grazing animals. This weed grows best in clay soils, often in rangelands. Musk thistle is a biennial weed that has a deep, fleshy taproot and reproduces by seed, and often infests roadsides. Scotch thistle is a biennial weed that reproduces by seed and can form dense stands that are difficult to penetrate. This weed has a fleshy taproot and often infests roadsides. Spotted knapweed is a biennial weed

that has a deep, stout taproot, and can be found on dry, well drained soils, and often infests roadsides and rangelands. This weed reproduces by seed and lateral roots (NDA 2013).

Cheatgrass (*Bromus tectorum*), an invasive weed, is also know to occur in the Pine Nut Mountains. Cheatgrass is an annual grass that displaces native perennial shrub, grasses and forbs because of its ability to germinate quicker and earlier than native species, thus outcompeting natives for water and nutrients. Cheatgrass is also adapted to recurring fires that are perpetuated in part by the fine fuels of the dead plants.

Riparian areas and disturbed areas are the locations most at risk of noxious weed invasions and establishment. Cheatgrass is found throughout the HMA. Areas damaged by fire are the locations where cheatgrass densities are greatest. As noxious weeds and invasive species increase, overall habitat conditions deteriorate with declining biodiversity.

4.7 Rangeland Health Assessments

The attributes of rangeland health are soil site stability, hydrologic function and biotic integrity. Soil site stability is the capacity of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water. Hydrologic function is the capacity of an area to capture, store and safely release water from rainfall, run-on, and snow melt, to resist a reduction in this capacity and to recover this capacity when a reduction does occur. Biotic integrity is the capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes and to recover this capacity when losses do occur. The biotic community includes plants, animals and microorganisms occurring both above and below ground.

Table 13 lists the rangeland health assessments and their ratings. These values indicate the degree of departure of observed conditions from what is expected for the site. For example, a rating of NS is a low departure from what is expected and thus healthy rangelands. A rating of ET indicates a high departure from what is expected and thus unhealthy rangelands.

Table 13. Rangeland Health Assessments and Ratings.

Site Name	Ecological Site	Interpreting Indicators of Rangeland Health			Year of Data Collection
		Soil / Site Stability	Hydrologic Function	Biotic Integrity	
Churchill Canyon - 01	R026XY023NV	NS	NS	SM	2011
Clifton-01	R027XY020NV	SM	SM	M	2012
Clifton-02	R026XY016NV	NS	SM	M	2012
Clifton-03	R027XY020NV	SM	M	M	2012
Clifton-04	R027XY020NV	NS	M	ME	2012
Eldorado 01	R026XY025NV	SM	M	ME	2012
Eldorado-02	R026XY025NV	NS	NS	NS	2014
Eldorado-03	R026XY025NV	NS	NS	SM	2014
Hackett Canyon - 01	R026XY023NV	SM	SM	M	2012
Mill Canyon - 01	R026XY005NV	SM	SM	M	2011
Mill Canyon -03	R026XY025NV	SM	SM	M	2011
Mill Canyon -06	R027XY020NV	NS	SM	SM	2012
Mill Canyon - 07	R026XY023NV	M	M	M	2012
Mill Canyon – RH1	R027XY020NV	NS	SM	SM	2013
Mill Canyon – RH 2	R026XY025NV	SM	M	ME	2013
Mill Canyon – RH 3	R027XY020NV	SM	M	ME	2013
Rawe Peak - 01	R026XY010NV	NS	NS	SM	2014
PN-PMU-26	R026XY023NV	SM	M	ME	2013
Churchill Canyon - 01	R026XY023NV	NS	NS	SM	2011

NS – None to Slight
SM – Slight to Moderate
M – Moderate
ME – Moderate to Extreme
ET – Extreme to Total

4.8 Soil Site Stability

Within the HMA there was a low degree of departure between observed soil stability conditions and what was expected for the sample sites. The majority of the areas were rated with a NS or SM departure from reference conditions. The majority of the plots had none or little evidence of rills, water flow patterns, pedestals, terracettes, gullies, wind-scoured areas, blowouts, depositional areas, litter movement, soil surface loss and compaction layers. However, most of the soil stability ratings were lower than the reference ratings indicating reduced soil resistance to erosion. Bare soil was generally between 5.1 percent to 15 percent, lower percentages of bare ground indicate a lower susceptibility wind erosion. Vegetative canopy gaps are related to risk of wind erosion. On average 25 percent of the area sampled had vegetative canopy gaps greater than 6.5 feet in length, but most of the sample areas also had a high percentage of rock cover.

Perennial shrub cover ranged from 13 percent to 29 percent, and most of these values were within the shrub cover range listed on the reference sheets.

Perennial grass cover was lower than expected. Two transect locations in the Eldorado Canyon and Rawe Peak allotments recorded no perennial grass cover. Four transect locations recorded perennial grass cover less than five percent in the Eldorado Canyon and Clifton allotments. The remaining transects recorded perennial grass cover from six percent to 29 percent. The average

cover value for perennial grasses was nine percent. The departure in soil site stability was primarily due to current vegetative conditions.

4.9 Hydrologic Function

The ratings for hydrologic function ranged between NS and M. However, the majority of the areas were rated with a SM or M departure from reference conditions. At the majority of the sample sites there were few observations of rills, water flow patterns, pedestals, terracettes, gullies, soil surface loss and compaction layers. However, soil stability ratings for the majority of the sample areas were lower than the reference ratings indicating decreased hydrologic function. Bare soil was generally between 5.1 percent to 15 percent, lower bare ground values indicate lower susceptibility water erosion.

The amount of litter ranged from three percent to 44 percent. The majority of the transects had litter amounts appropriate to the reference description or higher. The presence of annual invasive plant species cheatgrass has increased litter amounts at these sites. The one exception was the Mill Canyon 01 transect where the litter amount was less than expected. Low levels of litter can indicate disturbances such as wildfire, high levels of herbivory, extended drought or combinations of disturbances.

Perennial plants such as sagebrush capture snow, increasing soil water availability in the spring. High bunchgrass densities increase water infiltration by improving soil structure and slowing runoff. Many of the sites within the HMA have fewer bunchgrasses than described on the reference sheets. The reduction in bunchgrasses is contributing to soil site instability and decreased hydrologic function. The departure in hydrologic function was primarily due to current vegetative conditions.

4.10 Biotic Integrity

The rating for biotic integrity ranged from NS to ME, but the majority of the ratings indicated M departures from reference conditions. At the majority of the sample sites there were few observations of soil surface loss and compaction layers. However, soil stability ratings for the majority of the sample areas were lower than the reference ratings indicating decreased site resiliency.

Perennial shrub cover ranged from 13 percent to 29 percent, most of the values were within the shrub cover ranges listed on the reference sheets. The dominant shrub species included sagebrush, bitterbrush and rabbitbrush.

Perennial grass cover was lower than expected. Two transect locations in the Eldorado Canyon and Rawe Peak allotments recorded no perennial grass cover. Four transect locations recorded perennial grass cover was less than five percent in the Eldorado Canyon and Clifton allotments. The remaining transects recorded perennial grass cover from six percent to 29 percent. The average cover value for perennial grasses was nine percent. The dominant perennial grass species included Sandberg's bluegrass and squirreltail. The reference sheets indicate Thurber's needlegrass, desert needlegrass and Indian ricegrass should be the dominant species at these sites but the species were not intercepted during monitoring. Overgrazing results in the density of palatable species such as needlegrass and ricegrass decreasing and the densities of less palatable species such as Sandberg's bluegrass and squirretail increasing.

The amount of litter ranged from three percent to 44 percent. The majority of the transects had litter amounts appropriate to the reference description or higher. However, the presence of annual invasive plant species cheatgrass has increased litter amounts at these sites. The one exception was the Mill Canyon 01 transect where the litter amount was less than expected. Low levels of litter can indicate disturbances such as wildfire, high levels of herbivory, extended drought or combinations of disturbances.

The invasive species cheatgrass was present at all of the monitoring plots, and provided the highest amount of foliar cover at eight plots. Foliar cover values (exposed leaf area) for cheatgrass ranged between 20 percent and 50 percent.

The departure in biotic integrity was primarily due to shifts in species composition (fewer native perennials and more annual species) and reduced species richness for perennial plants. Although perennial grasses are capable of reproduction, the amount of reproduction is reduced due to the reduced number of perennial plants. Departure from the reference sheet is also due to the presence and abundance of the invasive species cheatgrass.

4.11 Riparian Assessments

Within the HMA, the majority of riparian areas are lentic or riparian-wetland areas other than a lotic (riverine) area. Lentic areas provide enough available water to the root zone to establish and maintain riparian-wetland vegetation. Lentic riparian-wetland areas are associated with still water systems. These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (i.e., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel. Conversely, lotic riparian-wetland areas are associated with rivers, streams, and drainage ways. Such wetlands contain a defined channel and floodplain. The channel is an open conduit, which periodically or continuously carries flowing water, dissolved and suspended material. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the lotic wetland. There are several lotic systems within the HMA.

Lentic and lotic riparian-wetland areas are functioning properly when adequate vegetation, landform, or debris is present to:

- Dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality;
- Filter sediment and aid floodplain development;
- Improve flood-water retention and ground-water recharge;
- Develop root masses that stabilize islands and shoreline features against cutting action;
- Restrict water percolation;
- Develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterbird breeding, and other uses; and
- Support greater biodiversity.

Most areas in the Great Basin do not have the potential or require large wood to dissipate stream energy associated with high streamflows. Vegetation such as willows, sedges and rushes can dissipate energy and are therefore important in maintaining soil stability and preventing erosion.

The riparian functional assessment (RFA) is a qualitative method for assessing the on-the-ground condition of riparian-wetland systems in order to determine how the system is functioning in its current state and current management. The RFA refers to a consistent approach for considering hydrology, vegetation and erosion/deposition (soils) attributes and processes to assess the condition of riparian wetland areas. The on-the-ground condition refers to how well the physical processes are functioning. Proper functioning condition (PFC) is a state of resiliency that will allow a riparian-wetland area to hold together during high wind events or overland flow events with a high degree of reliability. This resiliency allows an area to then produce desired values, such important habitat including forage for birds and other wildlife species. Riparian-wetland areas that are not functioning properly cannot sustain these values. In many cases erosion and channelization will occur in these non-functioning stretches leading to the lowering of the water table and the further loss of wet meadow and riparian systems. Once erosion occurs in stream bottoms it is difficult to reverse and often leads to the lowering of the water table.

A RFA was conducted at 26 sites within the HMA over the last 15-years (Figure 8). Appendix B lists the name, location, allotment, and rating of those assessments. Of the 26 riparian areas assessed, 23 percent are in PFC; 19 percent of the riparian areas are rated functioning-at-risk (FAR) with a downward trend; and 58 percent of the riparian areas assessed in the HMA are non-functioning (NF). Of the 23 percent rated PFC, only one riparian area is located in Clifton Allotment (with documented heavy horse use), and has an intact fence enclosure protecting it from grazing. The other five riparian areas rated PFC have no documented horse use or are reaches of larger systems without evidence of wild horse pressures. Of the 19 percent rated FAR, 80 percent have a downward trend due to excessive grazing and hoof action impacting riparian values, where four riparian areas have documented impacts from wild horses and one riparian area has documented impacts from livestock (cattle) grazing with no sign from wild horses. Of the 58 percent rated NF, the common impacts are from excessive horse use which has degraded riparian functionality. A few NF riparian areas are showing a drying trend over time, but data is not available to identify the specific cause of the drying trend, potential causes include soil compaction; groundwater draw down from surrounding valleys; or climate change.

Riparian Functional Assessments by Allotment.

Clifton

The BLM has assessment or monitoring data on 14 riparian areas in the Clifton Allotment. Thirteen RFAs were completed in the Clifton Allotment since 2002, with 11 assessments completed in the past three years. Seven of these 14 riparian assessments have multiple ratings over time, and data shows a downward trend due to excessive wild horse use.

Currently, there is one riparian area (Hercules Mine Spring) in PFC within the Clifton Allotment. Before this riparian area was fenced, it was rated as FAR. The fence, still in place, has eliminated wild horse grazing pressure and allowed for the riparian area to

recover to PFC. The fence was designed to exclude livestock and horses while still allowing wildlife access to the riparian area.

There are two riparian areas rated as FAR. West Barton Spring is FAR with a fence enclosure (put in place following the 2002 assessment) that has been pushed or knocked down multiple times in recent years. The riparian area was in recovery in 2013, with 25 identified species of riparian vegetation present. However, with the fence repeatedly pushed down in 2013, 2014 and 2015, the riparian vegetation and hydric soils have been adversely impacted. The current rating of West Barton Spring reflects a downward trend due to excessive horse use. The second riparian area, Little Nettles Spring, was FAR in 2002, with a downward trend, notes sited evidence of heavy horse grazing on small willows, severe impacts to the channel banks, vegetation and water quality. Current photos in Appendix D show the system still exists.

Data shows that 11 springs are currently rated as NF, due to excessive wild horse use causing of the loss/severe reduction of riparian vegetation, soil compaction from hoof action and degradation of hydrologic function at each site. One spring is rated NF due to loss of water, from a puncture in the confining layer which keeps water at the soil surface. Due to the loss of surface water this system is no longer be considered a spring and the associated wet meadow is now dry.

Mill Canyon

Riparian functional assessments were conducted at two riparian sites. Greg's Cabin Meadow Spring went dry sometime between 2002 and 2013. The current rating for this riparian area is NF due to lack of water. The other site, Pony Meadow Artesian Well, is FAR due to a knickpoint below the anthropogenic source and wild horse hoof action causing disturbance of surface and subsurface flow patterns.

Eldorado Canyon

Eldorado Canyon Creek is the only assessed riparian area on this allotment. The creek is FAR in the upper reach with excessive erosion from undissipated stream flow due to road management issues. The BLM has no documentation of wild horse impacts to the lower reach, however there is evidence of horse presence in the lower reach.

Hackett Canyon

Hackett Canyon Allotment has no riparian functional assessments on file, besides the Eldorado Canyon Creek assessments. Eldorado Canyon Creek is the boundary between the two allotments.

Buckeye

Buckeye Allotment has no riparian functional assessments on file and no known perennial water sources. Bull Run Spring ran in the 1980's, but was dry in 2012, with a 30-foot tall pinyon pine growing at the source, inside the enclosure.

Rawe Peak

Rawe Peak Allotment had a riparian functional assessment completed before 1995 with no supporting notes (rating PFC). Currently, the Rawe Peak North Spring, supporting the riparian area, is dry and not considered a functioning riparian area.

Sunrise

Four riparian functional assessments were completed in 2015 on Sunrise Allotment. One stream reach is in PFC with stability of the system held in place topographically. One spring is PFC, due to removal of grazing pressure. One spring is FAR due to previous cattle grazing pressure causing surface and subsurface disturbance to the hydrologic function. The fourth riparian area is in NF condition from to lack of water, most likely due to pinyon-juniper encroachment, but potentially from a puncture to the confining layer of the spring expression.

Churchill Canyon

This allotment has one riparian area within the HMA. This riparian area, called Mud Spring, was rated NF in 2007, due to excessive erosion and rapid draining of the system.

Sand Canyon

No wild horses have been observed in the riparian areas in Sand Canyon. The riparian areas include the newer Taperneck Spring, first observed after the Carson City effluent pond came on-line, and a reach of the Carson River. There are no other known existing water sources on this allotment.

4.12 Water Sources and Availability

Water sources considered include springs, seeps and streams on public land; not included are wildlife guzzlers and wells. Wells on public lands are range improvements for livestock and sometimes wildlife (if there was a cooperative agreement in place), many wells are not in current use and therefore unmaintained.

Based on the Water Resource Inventory GIS geodatabase, a map was created to display water availability in the HMA, a rating of water available, water unavailable, or water availability unknown is in Figure 4.

The BLM has record of 83 water sources in the HMA. Based on field remarks from the BLM Water Resource Inventory (1980), 31 water sources (or 37 percent) have perennial surface water and are considered water sources for wild horses, livestock and or wildlife; 34 locations (or 41 percent of the total water sources) may have riparian vegetation or an old development, but do not have surface water available for use or measurements; and 18 locations (or 22 percent of the total water sources) are unknown for water availability and/or may vary seasonally.

4.13 General Wildlife

The Nevada Wildlife Action Plan describes 22 key habitat types and identifies wildlife species assemblages for each (Wildlife Action Plan Team [WAPT] 2012). The vegetation types in the HMA can structurally and functionally be combined into three major wildlife habitats:

sagebrush, pinyon-juniper woodlands, and cold desert shrub (scrubland) (Figure 5). Riparian areas in the HMA also provide habitat.

Sagebrush - Sagebrush communities are important to a variety of wildlife, including sagebrush obligates such as Bi-State sage-grouse, Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes montanus*), and sage sparrow (*Amphispiza belli*). Additionally, these communities are important to other species that may be present during certain times of the year, such as pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), black-throated sparrow (*A. bilineata*), ferruginous hawk (*Buteo regalis*), vesper sparrow (*Pooecetes gramineus*), loggerhead shrike (*Lanius ludovicianus*) and gray flycatcher (*Empidonax wrightii*). Raptors, such as ferruginous hawks, spend most of their time hunting over sagebrush where they primarily prey on ground squirrels and jack rabbits (WAPT 2012).

Pinyon-Juniper Woodlands - Pinyon-juniper woodlands provide a variety of sheltering functions for wildlife that range from hiding cover to cavities and nest sites for birds, bats, and small mammals (WAPT 2012). A critical product of these woodlands is the pinyon nut crop, which serves as an important food source for the pinyon jay (*Gymnorhinus cyanoephalus*), Steller's jay (*Cyanocitta stelleri*), western scrub jay (*Aphelocoma californica*), and Clark's nutcracker (*Nucifraga columbiana*) (Ryser 1985). Other wildlife species associated with this habitat type include ferruginous hawk, mule deer, and black bear (*Ursus americanus*).

Cold Desert Shrub - Ricegrass (*Achnatherum hymenoides*) and shadscale (*Atriplex confertifolia*) seeds are important food sources in cold desert shrub habitat, and soils tend to be loose and sandy or gravelly and easily excavated by burrowing animals. Wildlife species associated with this habitat type include kit *fox (Vulpes macrotis),* long-nosed leopard lizard *(Gambelia* wislizenii), desert horned lizard (*Phrynosoma phatyrhinos*), and Great Basin collared lizard (*Crotaphytus bicinctores*) (WAPT 2012). Many wildlife species use both cold desert shrub and sagebrush habitats. For example, kit foxes den in sandy soils in desert scrub habitat and forage for prey in sagebrush plant communities.

Riparian Areas - The characteristics of individual springs can vary tremendously in terms of flow, water chemistry, and habitats provided for wildlife species. Many spring systems important to wildlife represent little more than seeps. In addition to their critical importance to aquatic species, they also are important for terrestrial wildlife. Springs provide a vital source of water and food for a wide range of wildlife from big game to bats. None of the riparian assessments recorded any aquatic wildlife species.

Primary game species within the HMA include mule deer and pronghorn. Other upland game species include California quail (*Callipepla californica*), chukar (*Alectoris chukar*), and band-tailed pigeon (*Patagioenas fasciata*).

The NDOW has identified most of the HMA as year-round habitat for mule deer. The northeast side of the HMA is year-round habitat for pronghorn. Pronghorn use lower elevations in fall and spring but move to higher elevations in deep winter and mid-summer to escape temperature extremes. Pronghorn also use areas south of Dayton year round, as documented by the BLM on game camera pictures. All of the HMA is considered habitat for black bear.

4.14 BLM Sensitive Species (Animals)

A list of Nevada BLM sensitive species was released in 2011 (IM No. NV-2011-059 with the final list released in October 2011). The BLM sensitive animals that may occur in the HMA because they are associated with the habitat types present in the HMA are listed in Appendix C. BLM sensitive species use a variety of habitats in the HMA; habitats consist of sagebrush, pinyon-juniper woodlands, cold desert shrub, and riparian areas.

Bi-State sage-grouse are highly adapted to sagebrush; most of the year-round diet of adults is made up of sagebrush leaves, which gives the bird the ability to winter on sagebrush range. Sagebrush species eaten by grouse include, mountain big sagebrush (*Artemisia tridentata vaseyana*), Wyoming big sagebrush (*A. t. wyomingensis*), low sagebrush (*A. arbuscula*), black sagebrush (*A. nova*), fringed sagebrush (*A. frigida*), and silver sagebrush (*A. cana*). Sage-grouse depend on mature shrubs for nesting structure, protection from predators, and thermal cover. They nest on the ground under low-growing sagebrush bushes enhanced with thick bunchgrass understory. Diverse plant communities with abundant insects are particularly important during the early brood-rearing period; chick survival is directly linked to availability of food and cover of grasses (GBBO 2010). High quality brood-rearing habitat with sufficient moisture to allow persistence of green forbs until late summer may be a limiting factor in Nevada (GGBO 2010).

Most of the eastern half of the HMA has been delineated as Bi-State sage-grouse habitat (35,152 acres) in the *Greater Sage-Grouse Bi-State Distinct Population Segment Forest Plan Amendment FEIS* (Figure 6).

The estimated Bi-State sage-grouse population in the Pine Nut Mountains for 2009 was between 89-107 birds. There is an active lek in the Mill Canyon area of the HMA. There is a lek outside the HMA in the nearby Buckskin Range and a potential new lek outside the HMA in the south end of the Pine Nut Mountains on Bald Mountain has been identified. Breeding/nesting habitat occurs in the Mill Canyon area and most birds move in a southerly direction from this area after the breeding period to brood-rearing/summer habitat around Mount Siegel and Bald Mountain in the south end of the mountain range. The habitat between the north and south ends of the Pine Nut Mountains is crucial habitat that serves as a seasonal movement corridor. Based on sage-grouse telemetry data, sage-grouse appear to travel relatively long distances to summer and fall habitat in the south. During July, the average distance to the Mil Canyon lek was over 25-miles.

Pygmy rabbits (*Brachylagus idahoensis*) are highly dependent on sagebrush to provide food and shelter throughout the year and are typically associated with tall, dense stands of big sagebrush growing in deep, loose soils in which they can construct burrows. Big sagebrush is the primary food source, but grasses and forbs are also eaten (WAPT 2012). The BLM and the Nevada Department of Wildlife have not documented pygmy rabbit habitat or their occurrence within the Pine Nut Mountains. According to the Nevada Natural Heritage Program, the Pine Nut Mountains is not within the range of this species (NNHP 2001) and there are no records for or known occurrences of pygmy rabbit within Douglas, Lyon and Carson City Counties, Nevada (FWS 2010a).

4.15 BLM Migratory Birds

The migratory birds that may occur in the HMA because they are associated with the habitat types present in the HMA are listed in Appendix C. BLM migratory birds use a variety of habitats in the HMA; habitats consist of sagebrush, pinyon-juniper woodlands, cold desert shrub, and riparian areas.

Sage sparrow, sage thrasher, and Brewer's sparrow distribution is closely tied with that of sagebrush. These species require tall sagebrush shrubs for nesting or song perches and an open understory of native bunchgrasses and forbs. They depend heavily on the shrub component for nesting substrate. Loggerhead shrikes also use mature shrubs for nesting structure, protection from predators, and thermal cover. Species such as mourning doves (*Zenaida macroura*) and pinyon jays use sagebrush habitat, but are also dependent on woodland.

Multiple species of raptors likely occur in the HMA. Current diversity exists because of the proximity of different habitat types that provide nesting, roosting, and foraging sites. Ferruginous hawks nest in juniper trees, but prefer open sagebrush for foraging. Ferruginous hawks and golden eagles spend most of their time hunting over sagebrush for ground squirrels, jackrabbits, and other prey. These raptors are limited by prey densities and need sagebrush habitat with a productive herbaceous understory that provides an abundant prey base (GBBO 2010).

4.16 Wildfire and Vegetation Treatments

The Pine Nut Mountains were subject to a historic regime of wildfire caused by lightning strikes. Natural-caused fire can burn several acres to several thousand acres during one event. In more modern times, the area is also subject to man-caused wildfire in addition to natural (lightning-caused) fire. The wildfire history for the HMA is included in Table 14. Past and present vegetation treatments (Table 15) have been completed in the HMA to reduce catastrophic wildfire risks and to influence plant community composition and diversity. In April 2014 the BLM approved the Pine Nut Land Health Project which would treat portions of the HMA (BLM 2014).

Table 14. Historic Large Fires.

Fire Name	Fire Year	Fire Cause	Acres
Como	2012	Natural	768
Laurel	2011	Human	318
Como	2008	Human	451
Adrian	2007	Natural	14,004

Fires greater than 100 acres.
Source: BLM Wildland Fire Management Information (2015).

Table 15. Past/Present Vegetation Treatments.

Project Name	Treatment Year(s)	Treatment Type(s)	Acres
Pine Nut Land Health (Mill Canyon 2, Illinois, Lyon units)	2014-2015	Lop and scatter, grinding	3,355
Buckskin Valley	2012-2014	Lop and scatter, grinding	184
Mill Canyon	2007-2010	Lop and scatter, grinding	2,383
Brunswick Extension	2006	Grinding	30

Source: BLM GIS database (2015).

SECTION V. CONCLUSIONS AND RECOMMENDATIONS

Monitoring indicates the health of upland areas are primarily trending downward (see photos in Appendix D). In the north and northeast portion of the HMA, the downward trend of upland vegetative communities coincides with wild horse use levels on perennial grass species in excess of 55 percent. Horse use in this portion of the HMA has been identified as a causal factor contributing to the recent downward trend. Utilization refers to the proportion of the current years forage production that is consumed and or destroyed by grazing animals. The FMUD established a maximum utilization rate of 55 percent for the combined use by livestock and wild horses.

Recommended utilization levels are established depending upon how fully each forage species in the plant community can be defoliated and still maintain or improve in vigor. In 1995 when the FMUD was issued the number of palatable perennial grasses was declining. The FMUD established stocking levels for both wild horses and livestock based on the available forage, and modified livestock grazing seasons to reduce the number of grazing animals during vegetative growth and reproductive periods. With the exception of the Churchill Canyon and Sunrise allotments, virtually no livestock use has occurred within the HMA since 1995, however, horse numbers have exceeded the AML and the use limit of 55 percent. Palatable perennial grasses (needle grass and rice grass) are continuing to decline within the HMA. Rangeland health data indicates the biotic component of the upland plant communities have moderately departed from the reference conditions due to the absence or reduction of palatable perennial grass species. Holecheck (2004) recommends a utilization rate of 30-40 percent for ranges in poor condition. If wild horse use continues to be high or increases, the downward vegetative trend is expected to accelerate further reducing the number of wild horses that the HMA can support. To address the overuse and loss of perennial grass plants the wild horse population should be adjusted to the established AML by grazing allotment, the AMLs were established by allotment and calculated to maintain or improve rangeland condition, by allowing more use to occur the rangeland condition is deteriorating.

RFAs indicate the health of riparian areas within the HMA are primarily trending downward (see photos in Appendix D). Of the 26 riparian areas assessed, 23 percent are in PFC; 19 percent of the riparian areas are rated FAR with a downward trend; and 58 percent of the riparian areas assessed are NF. In the northeast portion of the HMA, the riparian areas are rated at FAR and NF primarily due to wild horse impacts, which overlaps with the highest wild horse inventory numbers and wild horse use. The exception is Hercules Spring which is in PFC but wild horses do not have access to the riparian zone due to fencing. The other five riparian areas rated PFC have no documented horse use or are reaches of larger systems without evidence of wild horse pressures. Of the 19 percent rated FAR, 80 percent have a downward trend due to excessive grazing and hoof action impacting riparian values, four riparian areas have documented impacts from wild horses and one riparian area has documented impacts from livestock (cattle) grazing with no sign of wild horses. Of the 58 percent rated NF, the common impacts are from excessive horse use which has degraded riparian functionality. A few NF riparian areas are showing a drying trend over time, but data is not available to determine the exact causes of loss of riparian functionality, e.g. soil compaction; groundwater draw down from surrounding valleys; or climate change. By adjusting the wild horse population to the established AML by grazing allotment

pressure on the springs and seeps would be substantially reduced, however, some of the lesser producing springs and seeps may need to be fenced for improvement to occur. Even a small number of horses can adversely impact small riparian areas as compaction due to hoof action is concentrated. Compacting wet soils can further decrease flows, prevent riparian vegetation from growing which can result in the further loss of soils. Actions to restore the ecological balance include gathering and removing excess wild horses to the low AML of each grazing allotment of the HMA, and applying population control treatments to slow the growth of the wild horse population. Additional management actions should be considered for an indefinite period of time, as environmental conditions such as drought are variable, and wild horse populations would be expected to continue to increase unless further intervention occurs. Fencing riparian areas may be necessary in order for recovery to occur.

Sustainable use requires achieving and maintaining a thriving natural ecological balance and multiple-use relationship between the wild horse population, wildlife, livestock and plant communities within and outside the HMA. Removals at this time are necessary due to the overpopulation of wild horses and to prevent further deterioration of rangeland resources. Genetic data should be collected to ensure that acceptable genetic diversity is maintained within the remaining herd. If necessary a few horses from a different HMA may be released into the HMA to increase genetic diversity

SECTION VI. PUBLIC INPUT

Pine Nut Herd Management Area Draft HMA Evaluation
The BLM made the *Pine Nut Herd Management Area Draft HMA Evaluation* available for public review, and to solicit information from the public on vegetative trends and other data the public may have in their possession (BLM 2015).

On September 8, 2015 the BLM issued a press release providing public notification of the availability of the *Pine Nut Herd Management Area Draft HMA Evaluation* and maps. Notification was also made to 94 individuals or organizations on the Carson City District wild horse mailing list, and 27 individuals or organizations on the BLM Nevada State Office wild horse mailing list. On September 10, 2015 the announcement was published in *The Horse* (website), and September 11, 2015 in *The Record-Courier* (newspaper). On September 16, 2015 an article appeared in the *Nevada Appeal* (newspaper) (with a statement that the input period had been extended until October 22, 2015). On September 19, 2015 the press release was published on the *Protect Mustangs* website. On September 21, 2015 the BLM issued a second press release announcing the extension of the input period from September 22, 2015 until October 20, 2015. Articles on the public input extension appeared on September 22, 2015 in *The Horse* (website) and *Carson Now* (website), and in the *Reno-Gazette Journal* (newspaper) on September 26, 2015. An error appeared in the September 21, 2015 news release and the BLM accepted data until October 22, 2015 for a total of 45-days.

In both news releases, the BLM specifically requested information from the public concerning:

- Vegetation condition;
- Utilization levels;
- Riparian condition; and
- Wild horse condition.

The following individuals or organizations were notified on September 8, 2015 of the *Pine Nut Herd Management Area Draft HMA Evaluation* availability or submitted comments and/or data to the BLM:

Adams, P.
Allured, R.
Anderson, B.
Babcock, L.
Barcomb, C.
Bloom, C.
Bollinger, A.
Briggs, K.
Brooks, E.
Carmack, V.
Citron
Coles, L.

Custer, L.
Dahl, J.
Demelo, L.
Demell, F.
Downer, C.
Brown, L.
Bumgarner
Essenpreis, J.
Fairbanks, G.
Fernandez, R.
Friesen, A.
Funk
Gavin, J.
Goodnight, D.
Gossett, B.
Grady, T.
Gregg, K. (Protect Mustangs)
Grubb. E.
Guzman, J.
Haddan, J.
Hanley, S.
Harmon, M.
Howard, A.
Humphrey, J.
Jacobs, J.
Kirk, M.
Kozak, L.
Lamm, W.
Lenzi, P.
Linebaugh, J.
Lohnes, R.
Lowe, D.
Lynch, E.
MacQuarrie, R.
Marron, J.
Matton, B.
McGinness, M.
Moellendorf, R.
Monroe, A.
Muller
Nepper, C.
Pabst, K.
Pagen
Pauli, D.
Peck, O.
Peeples, L.

Port, K.
Robinson, C.
Rose, S.
Roy, S.
Schubert, D.
Schultz, J.
Shellhammer, D.
Surber, J.
Swadell, S.
Tenneyins
Thornur, A.
Voltz, F.
Walsh, G.
Warner, B.
Warrell, S.
Weed, C.
Wilkinson, R.
Youngs, G.

American Wild Horse Preservation Campaign
American Wild Horse Preservation League
Friends of Animals
Fund for Animals
Lyon County Commissioners
Nevada Cattlemen's Association
Nevada Human Society
Nevada Department of Wildlife
Resource Concepts Inc.
The Mule Deer Foundation
U.S. Fish and Wildlife Service
Wild Horse Defenders
Wild Horse Education

Comments and Data Submitted

The BLM has reviewed the comments and/or data submitted to it. The BLM received 32 comment letters or emails on the *Pine Nut Herd Management Area Draft HMA Evaluation*. The BLM requested information from the public concerning:

- Vegetation condition;
- Utilization levels;
- Riparian condition; and
- Wild horse condition.

Based on the comments received, the BLM made minor clarifications to the content of the *Pine Nut Herd Management Area Draft HMA Evaluation* and incorporated those and others into this *Final Summary of Current Conditions*. The 32 comment letters or emails are included in

Attachment A. Most of the comments were outside the scope of the requested information from the public.

SECTION VII. LIST OF PREPARERS

BLM staff that contributed to this document.

Name	Program
Brian Buttazoni	Planning and Environmental Coordinator
John Axtell	Wild Horses and Burros Specialist
Katrina Leavitt	Rangeland Management Specialist
Pilar Ziegler	Wildlife Biologist
Dean Tonenna	Botanist
Niki Cutler	Hydrologist

SECTION VIII. REFERENCES

Bureau of Land Management (BLM). 1995. *Pine Nut Final Multiple Use Decision*. Carson City, Nevada. August.

_____. 2001. *Carson City Field Office Consolidated Resource Management Plan*. Carson City, Nevada. May.

_____. 2010. *Wild Horses and Burros Management Handbook, H-4700-1*. U.S. Department of the Interior. Washington, D.C. July.

_____. 2010a. *Final Environmental Assessment, Clan Alpine, Pilot Mountain and Pine Nut Herd Management Area Gather Plan*. Carson City, Nevada. October.

_____. 2014. *Pine Nut Land Health Project, Final Environmental Assessment*. Carson City, Nevada. April.

_____. 2014a. *Draft Resource Management Plan and Environmental Impact Statement. Carson City, Nevada*. November.

_____. 2015. *Pine Nut Herd Management Area Draft HMA Evaluation*. Carson City, Nevada. September.

_____. 2016. *Wild Horse and Burro Program Data*. Website located at: http://www.blm.gov/wo/st/en/prog/whbprogram/herd_management/Data.html. Accessed on May 26, 2016.

_____. 2016a. *Record of Decision and Land Use Plan Amendment for the Nevada and California Greater Sage-Grouse Bi-State Distinct Population Segment in the Carson City District and Tonopah Field Office*. Carson City, Nevada. May.

Great Basin Bird Observatory (GBBO). 2010. *Nevada Comprehensive Bird Conservation Plan*. Version 1.0. http://www.gbbo.org/bird-conservation-plan. Accessed on May 26, 2016. Great Basin Bird Observatory, Reno, Nevada.

Holechek, J. (2004). *Range Management: Principles and Practices*, Fifth Edition. Upper Saddle River, New Jersey: Prentice Hall.

Mozingo, H.N. 1987. *Shrubs of the Great Basin, A Natural History*. University of Nevada Press. Reno, Nevada.

Ryser, F.A. 1985. *Birds of the Great Basin, A Natural History*. University of Nevada Press. Reno, Nevada.

U.S. Forest Service (USFS) 2015. *Greater Sage-Grouse Bi-State Distinct Population Segment Forest Plan Amendment, Final Environmental Impact Statement*. Sparks, Nevada. February.

U.S. Fish and Wildlife Service (FWS) 2010a. *Endangered and Threatened Wildlife and Plants: 12-Month Finding on a Petition to List the Pygmy Rabbit as Endangered or Threatened; Proposed Rule*. Federal Register notice September 30, 2010. Washington, D.C.

Wildlife Action Plan Team (WAPT) 2012. *Nevada Wildlife Action Plan*. Nevada Department of Wildlife. Reno.

Appendix A. Vegetation Trend by Grazing Allotment 1974 to 2015.

Allotment/Plot	Years Read	Years of Photo	Change Detected	Indicated Trend
Buckeye/ BE1	1975,1979, 1980,2004, 2015	1975,1976, 1977,1979, 1980,1983, 1986,1990, 1993,1996, 2004,2015	Data from 1975 identified three perennial grasses in the plot (Thurber needlegrass). Perennial grass numbers increased from nine plants in 2004 to twelve plants in 2015. This species of grass is palatable to both wild horses and livestock. An increase in palatable perennial grasses indicates grazing is not negatively influencing the plant dynamics at this site. Two bitterbrush shrubs were identified within the plot but were dead in the 2004 photographs. The photo record for this site shows an increasing density and size of pinyon and juniper trees. Signs of soil movement are also visible in the photo record. There is currently an upward trend for perennial grasses but this trend is expected to be short term, because the site is currently trending toward a tree state. Considering the increase in perennial grasses, the increase in tree densities, the decline in shrub numbers and soil movement the trend is rated as static. Livestock have not used the portion of the allotment within the HMA since 2006. Wild horse use within this portion of the HMA since 2006, was calculated from inventory data at 60 AUMs during 2013-2014. The AML for the Buckeye portion of the HMA is 493 AUMs. Because current grazing use has been below three percent on upland vegetation within the allotment, and the number of perennial grass plants increased at this monitoring location between 2004 and 2015 current grazing is not negatively impacting plant community dynamics.	Static
Buckeye/ BE2A	1974,1979, 1980,2004, 2015	1974,1975, 1976,1977, 1979,1980, 1983,1986, 1990,1993, 1996,2004, 2015	The area sampled, burned sometime in the 1960's prior to the establishment of the photo plot. Five crested wheatgrass plants (seeded perennial species) were documented on the 1974 datasheet, grass numbers increased to seven plants in 1980 but only one crested wheatgrass plant was recorded within the plot in 2004 & 2015. Crested wheatgrass is palatable to both wild horses and livestock. Grazing was likely a contributing factor to the decline in palatable perennial grasses between 1980 and 2004. The decline in palatable perennial grass coincides with a time period when permitted livestock use and wild horse number were higher than current management recommendations. A multiple use decision was issued in 1994 that reduced livestock and wild horse numbers within the herd management area. The recent trend for palatable perennial grass number is static between 2004 and 2015. One shrub was present within the plot in 1974 and three shrubs were present in 2015 (sagebrush and bitterbrush). An increase in desirable perennial shrubs is also documented in the panoramic photo record. The number of seeded perennial grass plants has declined but the density of shrubs on the site has increased reducing the amount of bare ground. The plot is located on a slope and the photo record for this site shows signs of soil movement. Considering the past decline and recent stability in perennial grass numbers, the increase in shrub numbers and soil movement the trend is rated as static to upward. Livestock have not used the portion of the allotment within the HMA since 2006. Wild horse use within this portion of the HMA since 2006, was calculated from inventory data at 60 AUMs during 2013-2014. The AML for the Buckeye portion of the HMA is 493 AUMs. Because current grazing use has been below three percent on upland vegetation within the allotment, and the number of perennial grasses at this monitoring location have remained static between 2004 and 2015 current grazing is not negatively impacting plant community dynamics.	Static to Upward

Allotment/Plot	Years Read	Years of Photo	Change Detected	Indicated Trend
Churchill Canyon/ CC2	1975,1979, 1980,2007, 2010,2015	1975,1977, 1979,1980, 1983,1986, 1990,1993 1996,1998, 2001,2007, 2010,2015	The data from1975 and 1980 indicate five sagebrush shrubs and one bitterbrush shrub in the plot. In 2007 and 2010 there were two sagebrush shrubs and one bitterbrush shrub within the plot. In 2015 there were still three sagebrush shrubs but the number of bitterbrush plants increased to two. The photo record for this site shows an increasing density and size of pinyon and juniper trees between 1975 and 2007. During this period the site was trending toward a tree state. Between 2007 and 2010 a tree removal project was implemented. In 2007 there were three bottlebrush squirreltail grasses in the plot. In 2010 the grasses had increased by one additional squirreltail grass and one Sandberg's bluegrass plant. By 2015 grass numbers had declined to one squirreltail grass and one needlegrass plant. Needlegrass is expected as a dominant species on this type of site, but was not recorded within the plot until 2015. Needlegrass is more palatable to both wild horses and livestock than squirreltail and Sandberg's blue grass. Due to its higher palatability to livestock and wild horses establishment of needlegrass indicates grazing if not currently negatively influencing the plant dynamics at this site. Considering that there were five desirable shrubs within the plot in 1975 and 2015, perennial grass numbers declined from three in 2007 to two in 2015 but there was a species shift toward more desirable grass species and the overall site is not currently trending toward a tree state the trend is rated as static to upward.	Static to Upward
Clifton/ C1	1975,1979, 1980,2015	1975,1976, 1977,1979, 1980,1983 1987,1990, 1993, 1996, 2015	The number of needlegrass plants within the plot was five in 1975, the number increased to six in 1979 and 1980, and declined to four in 2015. Sagebrush within the plot was one plant in 1975, the number of sagebrush increased to three plants in 1979 and declined to one plant in 1980 and 2015. The plot burned in 2012, the fire did not change the number of perennial shrubs or grasses within the plot. However, soil and litter movement are visible in the 2015 photos. No livestock grazing has occurred within this allotment since prior to 1988. Wild horse grazing did occur within the allotment between 2006-2014 (Table 4) and severe utilization (81%), of vegetation was documented within the allotment during 2013-2014 (Table 9). The grasses present at this plot in 2015 also showed signs of excessive grazing.	Static to Downward
Eldorado Canyon/ E1	1975,1979, 1980,2015	1975,1976, 1977,1979, 1980,1983, 1986,1990, 1993,1996, 1999,2015	None of the grass species identified were considered key forage species. Based on the range site description there should be a greater abundance of needlegrass at this location. The fourteen grasses present in the plot in 1980 consisted of Sandberg's bluegrass and bottlebrush squirreltail, wild horse grazing was noted on the data sheet. In 2015 three Sandberg's bluegrass and two squirreltail grasses were observed in the plot. The five shrubs within the plot in 1980 and 2015 consisted of sagebrush, bitterbrush and rabbitbrush. A large portion of the bitterbrush plant was dead in the 2015 photo. The panoramic photos show the increasing density and size of pinyon and juniper trees. The area is currently trending toward a tree state. Considering the decline in perennial grass numbers, the apparent decline in shrub vigor from the panoramic photos taken in 2015 and the increase in tree sizes and the trend is rated as downward. No livestock grazing has occurred within this allotment since prior to 1982, with the exception of sheep trailing which occurs for approximately one week every year. Wild horse grazing did occur within the allotment between 2006-2014 (Table 4) and severe utilization (81%), of vegetation was documented within the allotment during 2013-2014 (Table 9).	Downward
Eldorado Canyon/ EC2	1975, 1976, 1979,1980 ,2015	1975, 1976, 1977,1979, 1980,1983, 1990,1993, 1996,1999, 2015	In 1976 the perennial grass component consisted of five plants in the plot. The grasses present in the plot consisted of two Indian ricegrass plants and three squirreltail plants. The data collected in 1980 shows and increase of one ricegrass plant and two squirreltail plants. Indian ricegrass has been reduced from three mature plants identified in 1980 to one mature plant in 2015. Squirreltail has decreased from five plants in 1980 to one plant in 2015. Four sagebrush shrubs were identified in the plot in 1976, 1979, 1980 and three sagebrush shrubs were recorded in 2015. The panoramic photos show pinyon and juniper trees as a component of the plant community. Considering the decline in the number or perennial grasses and shrubs the trend is downward. No livestock grazing has occurred within this allotment since prior to 1982, with the exception of sheep trailing which occurs for approximately one week every year. Wild horse grazing did occur within the allotment between 2006-2014 (Table 4) and severe utilization (81%), of vegetation was documented within the allotment during 2013-2014 (Table 9).	Downward

Allotment/Plot	Years Read	Years of Photo	Change Detected	Indicated Trend
Hackett Canyon/ HC1	1976,1979, 1980,2015	1976,1977, 1979,1980, 1983,1987, 1990,1993, 1996,2015	The initial data from 1976 indicates that this site was dominated by low sagebrush (*Artemisia arbuscula*) with sparse understory of Indian ricegrass and bottlebrush squirreltail. The data from 1976 identified five perennial grasses present. Fire or some type of disturbance, possibly powerline construction occurred between 1983 and 1987. The 1987 photograph shows that perennial shrubs and grasses were cleared from the site. In 2015 the data documents four desert needlegrass (*Achnatherum speciosum*) plants in the plot. One bottlebrush squirreltail plant was also present. Bare ground is persistent throughout the plot. Perennial grass recruitment and establishment has been minimal for this site. The trend since disturbance was documented in 1987 has been static. No livestock use has occurred within this allotment since prior to 1988, although it is permitted. Wild horse grazing did occur within the allotment between 2006-2014 (Table 4) and severe utilization (82%), of vegetation was documented within the allotment during 2013-2014 (Table 9).	Static
Hackett Canyon/ HC2	1976,1979, 1980,2015	1976,1977, 1979,1980, 1983,1987, 1990,1993, 1996,2015	The initial data from 1976 indicates that this site was dominated by low sagebrush (*Artemisia arbuscula*) with sparse understory of Thurber's needlegrass and bottlebrush squirreltail. The data identified three Thurber's needlegrass plants and two bottlebrush squirreltail plants in 1976. In 1979 Thurber needlegrass was reduced by one plant. No other changes were recorded from 1976 to 1979. Data from 1980 indicate no change in perennial grass numbers. The shrub component remained unchanged. No Thurber's needlegrass plants were present 2015. The perennial grass component in the plot consisted of four Sandberg's bluegrass plants and three bottlebrush squirreltail plants. The shrub component in the plot remained unchanged. The panoramic photos show pinyon and juniper trees are present in f the plant community. Needlegrass is palatable to both wild horses and livestock. The absence of Thurber's needlegrass within the plot in 2015 indicates a downward trend for the site. Grazing was likely a contributing factor to the decline in palatable perennial grasses between 1980 and 2015. The decline in palatable perennial grass coincides with a time period when permitted livestock use and wild horse number were higher than current management recommendations. A multiple use decision was issued in 1994 that reduced livestock and wild horse numbers within the herd management area. No livestock use has occurred within this allotment since prior to 1988, although it is permitted. Wild horse grazing did occur within the allotment between 2006-2014 (Table 4) and severe utilization (82%), of vegetation was documented within the allotment during 2013-2014 (Table 9).	Downward
Mill Canyon/ MC1	1975,1979, 1980,2015	1975,1976, 1977,1979, 1980,1987, 1990,1993, 1996,1999, 2004,2015	In 1975 the perennial grass component consisted of one Thurber's needlegrass plant in the plot. Needlegrass is considered a key forage species. Two sagebrush shrubs were also identified in 1975. Two Thurber's needlegrass increased to two plants in 1979. The shrub component remained unchanged from the initial numbers reported in 1975. No change to the perennial grass numbers were identified by the data collected in1980. One perennial grass was identified 2015. The grass present in 2015 was identified as bottlebrush squirreltail (*Elymus elymoides*). No key grass species were identified in 2015. Invasive annuals are abundant on site. The data indicates a downward trend for the perennial grass population. The data from 2015 also shows the shrub component in decline. The shrubs documented in the datasheets from 1975 to 1980 are no longer living. Rubber rabbitbrush (*Ericameria nauseosa*) is the one shrub present in the plot in 2015. Poor plant vigor was documented for the shrubs and grasses in this plot. Livestock use is not permitted in Mill Canyon and the last livestock use occurred in 1996. Wild horse use estimated from inventory data increased from six AUMs in 2006 to 564 AUMs in 2014. Because current wild horse grazing use was 81 percent within the allotment (Table 9) and there was a decline in the number of perennial grass species and a shift from palatable (Thurber's needlegrass) to less palatable grass species (bottlebrush squirreltail) within the monitoring plot between 1980 and 2015, horse use has been identified as a causal factor in the recent downward trend.	Downward

Allotment/Plot	Years Read	Years of Photo	Change Detected	Indicated Trend
Mill Canyon/ MC2	1975,1979, 1980,2015	1975,1976, 1977,1979, 1980,1987, 1990,1993, 1996,1999, 2004,2015	In 1975 the perennial grass component consisted of five plants in the plot. One of the grasses identified in the 1975 data is considered a key species. The key grass species present in the plot was identified as Thurber's needlegrass. The other grass present were Sandberg's bluegrass (*Poa secunda*) and squirreltail (Elymus elymoides). Sagebrush and bitterbrush shrubs were also identified in the 1975. The data from 1980 showed no change in the number or type of species within the plot. One perennial grass, bottlebrush squirreltail (*Elymus elymoides*), was present in the plot in 2015. Key grass species were no longer present in the plot in 2015. The data indicates a downward trend for the perennial grass population. One bitterbrush shrub was present in the plot in 2015. The photo record for this site shows an increasing density and size of pinyon and juniper trees. The site is currently trending toward a tree state. Livestock use is not permitted in Mill Canyon and the last livestock use occurred in 1996. Wild horse use estimated from inventory data increased from six AUMs in 2006 to 564 AUMs in 2014. Because current wild horse grazing use was 81 percent within the allotment (Table 9) and there was a decline in the number of perennial grass species and a loss of the most palatable species (Thurber's needlegrass) within the monitoring plot between 1980 and 2015, horse use has been identified as a causal factor in the recent downward trend.	Downward
Mill Canyon/ MC3	1976,1979, 1980,2013	1976,1977, 1979,1980, 1987,1990, 1993,1996, 2004, 2013	In 1976 the perennial grass component consisted of twenty plants in the plot. The four ricegrass plants identified in 1976 are considered key species, the remaining grasses were identified as bottlebrush squirreltail (*Elymus elymoides*). Perennial grasses decreased from twenty mature plants in 1975 to thirteen plants in 1979. Perennial grasses declined from thirteen mature plants in 1979 to nine plants in 1980. One perennial grass was identified in 2013.The grass present in the 2013 plot was identified as bottlebrush squirreltail. No key grass species were present within the plot in 2013. Invasive annuals are abundant on site. The data indicates a downward trend for the perennial grass population in the plot. Six shrubs were identified in the plot in 1976 and 1979 (bud sagebrush and rabbitbrush). In 1980 one additional rabbitbrush was identified within the plot. By 2013 there were three bud sagebrush (*Picrothamnus desertorum*) shrubs within the plot and no rabbitbrush. Poor plant vigor was documented for the shrubs and grasses in this plot. This is supported by the photo record compile from 1976 to 2013.The photo record for this site shows soil displacement. Livestock use is not permitted in Mill Canyon and the last livestock use occurred in 1996. Wild horse use estimated from inventory data increased from six AUMs in 2006 to 564 AUMs in 2014.	Downward
Rawe Peak/ RP1	1976,1979, 1980,2015	1976,1979, 1980,1990, 1993,2015	The initial data from 1976 indicates two bottlebrush squirreltail (Elymus elymoides) plants present in the plot. No perennial grasses were identified in the plot in 1979 and one squirreltail was identified in 1980 and 2015. No key grass species and the reduction in the number of perennial grass plants within the plot, indicates a downward trend. The six shrubs in the plot consisted of bitterbrush, sagebrush, and snowberry (*Symphoricarpos albus*) in 1976. The 2015 data showed three shrubs within the plot, one of each of the species identified in 1976, the plant vigor for bitterbrush and snowberry was poor. One pinyon pine seedling was present in the plot in 2015. The photo record for this site shows an increasing density and size of pinyon and juniper trees between 1976 and 2015. The site is trending toward a tree state. Considering the decrease in the number of perennial grasses and shrubs and the increase in tree densities the trend is rated as downward. Livestock use is not permitted within this allotment and no livestock use has occurred since prior to 1988. Wild horse use estimated from inventory data was 72 AUMs in 2013-2014.	Downward

Allotment/Plot	Years Read	Years of Photo	Change Detected	Indicated Trend
Rawe Peak/ RP2	1976,1979, 1980,2015	1976,1977, 1979,1983, 1986,1990, 1993,1996, 2000,2015	The initial datasheet from 1976 indicates nineteen bottlebrush squirreltail (*Elymus elymoides*) plants, two Thurber's needlegrass plants and three Indian ricegrass plants present in the plot. The key grass species were Thurber's needlegrass and Indian ricegrass. Data from 1980 identifies two perennial grasses within the plot (needlegrass and squirreltail). In 2015 the data identify five bottlebrush squirreltail and one Sandberg's bluegrass (*Poa secunda*) in the plot. The perennial grass numbers have decreased from twenty four perennial grasses in 1976 to six perennial grasses in 2015 and no key grass species were present in the plot in 2015. The loss of Thurber's needlegrass and ricegrass from the plot indicates an overall decline in the condition of the site. The grass component is well below what would be expected for this site. The shrub component in the plot consists of bitterbrush and sagebrush. There were four shrubs within the plot in 1976 and 1979, five shrubs were recorded in 1980 and 2015. The shrub component in 2015 consists of sagebrush and bitterbrush which is unchanged from 1976. The photo record for this site shows an increasing density and size of pinyon and juniper trees between 1976 and 2015. The site is trending toward a tree state. Considering the decrease in the number of perennial grasses, the static number of shrubs since 1980 and the increase in tree densities the trend is rated as downward. Livestock use is not permitted within this allotment and no livestock use has occurred since prior to 1988. Wild horse use estimated from inventory data was 72 AUMs in 2013-2014.	Downward
Sand Canyon/ SC1	1976, 1979, 1980,2015	1976,1977, 1979,1980, 1988,1990, 1993,1996 2015	The data sheet from 1976 recorded two desert needlegrass plants within the plot, the number of needlegrass plants recorded in 1979 and 1980 was one. No needlegrass plants were present in the plot in 2015, but three squirreltail grasses were present. The shrubs within the plot have consisted of bitterbrush and sagebrush. There were five shrubs recorded in the plot between 1976 and 1980, but only two shrubs were recorded in 2015. The shrubs identified in 2015 consist of one sagebrush shrub and one bitterbrush shrub. Pinyon and juniper trees are present in the plant community. Needlegrass is a key species for this site and the loss of needlegrass within the plot indicates a decline in the condition of the site between 1980 and 2015. But the establishment of a less desirable grass species indicates a stabilization of the decline during that same time period. There is no permitted livestock use within the allotment and livestock use has not occurred since prior to 1988. Wild horse use estimated from inventory data ranged from 54 to 108 AUMs from 2006 through 2009 and utilization was less than three percent.	Static
Sand Canyon/ SC2	1976,1979, 1980, 2015	1976,1977, 1979,1980, 1988,1990, 1993,1996, 2015	The data from 1976 through 1980 indicates two Indian ricegrass plants present in the plot and the 2015 data identified one ricegrass and three needlegrass plants. This increase of two desirable perennial grass plants within the plot, indicates an upward trend for grasses. One shrub was present within the plot between 1976 and 2015. Pinyon and juniper trees are present in the plant community. There is no permitted livestock use within the allotment and livestock use has not occurred since prior to 1988. Wild horse use estimated from inventory data ranged from 54 to 108 AUMs from 2006 through 2009 and utilization was less than three percent.	Static to Upward

Allotment/Plot	Years Read	Years of Photo	Change Detected	Indicated Trend
Sunrise/ SR2	1974,1979, 1980,2007, 2015	1974,1975, 1976,1977, 1979,1980, 1983,1987, 1990,1993, 1996,2007, 2015	The area sampled, burned sometime in the 1960's prior to the establishment of the photo plot. Eight crested wheatgrass plants (seeded perennial species) were documented on the 1974 datasheet, grass numbers increased to eleven plants in 1979 and decreased to four crested wheat and two squirreltail plants by 1980. In 2007 two squirreltail plants were recorded in the plot and in 2015 there were no mature grasses within the plot but nine wheatgrass seedlings were observed. Crested wheatgrass is palatable to both wild horses and livestock. Grazing was likely a contributing factor to the decline in palatable perennial grasses between 1979 and 2007. The decline in palatable perennial grass coincides with a time period when permitted livestock use and wild horse number were higher than current management recommendations. A multiple use decision was issued in 1994 that reduced livestock and wild horse numbers within the herd management area. The recent trend for perennial grass number continued downward between 2007 and 2015 with the loss of two squirreltail plants, but the presence of nine wheatgrass seedling in 2015 indicates improvement. Seven sagebrush shrubs were present within the plot in 1974, this number declined to five in 1979, three in 1980 and 2007 and one in 2015. The trend for shrubs was downward due to the declining number of shrubs. The photo record for this site shows the increasing density and size of pinyon and juniper trees. The site was trending toward a tree state between 1974 and 2007. A tree thinning project was implemented after 2007, the 2015 photo record shows the reduction in tree density due to the thinning project. Considering the decreasing numbers of perennial grasses and shrubs within the plot, the thinning of tree densities and the establishment of grass seedlings within the plot the trend is rated static. Livestock use estimated from inventory data was from 106 to 163 AUMs from 2006 until 2014. No livestock use occurred in 2015. The FMUD specifically stated that livestock use would not be authorized until utilization levels by wild horses were below the allowable use levels for grasses and/or bitterbrush. There is no recorded wild horse use in this area for the time period from 2006 through 2014.	Static
Sunrise/ SR3	1975,1979, 1980,2007, 2015	1975,1976, 1977,1979, 1980,1983, 1987,1990, 1996,2007, 2015	The 1975 data identifies eleven perennial grasses within the plot, four Sandberg's bluegrass (*Poa secunda*), one Thurber's needlegrass, and six bottlebrush squirreltail (*Elymus elymoides*). However, by 1979 the data identifies only two Sandberg's bluegrass plants and in 1980 only one needlegrass. There were two needlegrasses in the plot in 2015. The trend for perennial grasses between 1975 and 1980 was downward the trend and between 1980 and 2015 was static. The 1975 data also identifies one bitterbrush and three sagebrush in plot. The 1979, 2007 and 2015 data indicate three shrubs (bitterbrush and sagebrush) within the plot. The trend for shrubs in the plot is static. Two pinyon pine seedlings were recorded in the plot in 2015. Livestock use estimated from inventory data was from 106 to 163 AUMs from 2006 until 2014. No livestock use occurred in 2015. The FMUD specifically stated that livestock use would not be authorized until utilization levels by wild horses were below the allowable use levels for grasses and/or bitterbrush. There is no recorded wild horse use in this area for the time period from 2006 through 2014.	Static

Appendix B. Riparian Functional Assessments.

Name	UTM_X	UTM_Y	Grazing Allotment/Status	Year	Status/Trend	Comments from Riparian Functional Assessment
Nettles Spring Complex (aka Fiddlers Spring, aka Party Spring)	281772	4344484	Clifton/No permitted use	2002	NF	"Wild horse use of Nettles Spring has denuded the area and trampled the spring."
Little Nettles Spring	281762	4344269	Clifton/No permitted use	2002	FAR	"Wild horse use is heavy with grazing on small willows evident. Impacts to channel from wild horse use are severe in places; channel banks, vegetation and water quality are affected. Downward trend."
Dangberg Spring	283755	4345414	Clifton/No permitted use	2015	NF	"Excessive horse use is degrading and compacting soils at the site."
Rush Spring	284623	4346985	Clifton/No permitted use	1993	FAR	Horses are compacting soils. Flow may be lost. Downward trend.
Egus Spring	284507	4347291	Clifton/No permitted use	<1995	FAR	No field notes. Photo comparison (1988 and 2014) tells story of downward trend.
Populus Spring (aka Hazlett Spring, aka Roadside Spring)	286054	4347065	Clifton/No permitted use	1994, 2013	FAR (1994), NF (2013)	1994: "Horses are keeping riparian vegetation cleared off with no regeneration occurring. Horses are adversely affecting surrounding watershed. Downward trend." 2013: "Denuded, heavy horse use, hoof action may be decreasing flow, compacted soils."
Pine Spring	286108	4346803	Clifton/No permitted use	1988, 2015	FAR, before rating method (1988), NF (2015)	1988 (off Riparian Monitoring Checklist): "Fair condition with little horse use documented." 2015: "Hydric soils are compacted from hoof action. Excessive horse use is degrading site."
Rose Spring	286592	4347291	Clifton/No permitted use	2014	NF	"Excessive horse use is impacting functionality."
West Barton Spring	287250	4345625	Clifton/No permitted use	<1995, 2002, 2013, 2015	PFC (<1995), FAR (2002), FAR (2013), FAR (2015)	A enclosure fence was built after the 2002 assessment to reduce wild horse impacts to the site. The riparian area was in recovery in 2013 (25 identified species of riparian vegetation), but with the fence down in 2013-2015 the riparian vegetation has been impacted and the current rating reflects a downward trend due to heavy/excessive horse use.
East Barton Spring	287307	4345781	Clifton/No permitted use	<1995, 2013	PFC (<1995), NF (2013)	The confining layer allowing surface water expression was anthropogenically punctured. East Barton Spring no longer exists.
Hercules Meadow (Mine) Spring	287805	4345551	Clifton/No permitted use	<1995, 2013	FAR (<1995), PFC (2013)	"A lot of wild horse trails and sign around enclosure."
Hercules Spring	287800	4345561	Clifton/No permitted use	2014	NF	"Excessive horse use is impacting riparian functionality."
Lower Hercules Spring	288376	4346541	Clifton/No permitted use	2014	NF	"Excessive horse use is preventing recruitment of cottonwood and other riparian vegetation and causing negative impacts on soils and their hydric characteristics."

Name	UTM_X	UTM_Y	Grazing Allotment/Status	Year	Status/Trend	Comments from Riparian Functional Assessment
Urrutia Spring	291367	4349199	Clifton/No permitted use	1988	NF, before rating method	1988 (off Riparian Monitoring Checklist): "Trampling of small meadow by cattle. Meadow dried up due to water development. No JDR."
Rawe Peak N. Spring	286582	4344557	Rawe Peak/No permitted use	<1995	PFC, NF (2014)	No supporting documentation of PFC rating was found. Rating was gleaned from Rawe Peak Allotment Evaluation (1995). Spring was dry in 1980 Water Source Inventory. Spring is dry, has been for some time.
Middle Eldorado Canyon	n/a	n/a	Eldorado Canyon / Hackett Canyon	2002	PFC	RFA covered a stream reach in T.15 N., R. 22 E., Sections 30 & 31.
Upper Eldorado Canyon	n/a	n/a	Sunrise/ Buckeye Allotments	2002	FAR	RFA covered a stream reach in T.14 N., R. 22 E., Section 6. Rating due to erosion and road management issues.
Greg's Cabin Meadow Spring	288113	4339926	Mill Canyon/No permitted use	<1995, 2002, 2013	FAR (<1995), NF (2002), NF (2013)	<1995: No field notes. 2002: "Lack of water flow and heavy grazing are the two major impacts to resource. The meadow was grazed in an extreme manor by both wild horses and cattle. There was no authorized use in the allotment." 2013: "Riparian vegetation is dead or dying. Riparian area is severely degraded due to lack of water. Horse evidence."
Pony Meadow Artesian Well	288627	4339954	Mill Canyon/No permitted use	2012	FAR	2012: Artesian well acting as spring head and supporting riparian area below dried out meadow. "Rating due to knickpoint, expanding Canada and Bull Thistle (noxious weeds), and wild horse hoof action causing disturbance of surface and subsurface flow patterns."
Unnamed Spring	287430	4328703	Sunrise	2015	NF	"Lack of water due to pinyon-juniper encroachment"
Chaining Spring	287609	4328822	Sunrise	2015	FAR	"Lower fence line was placed too high in riparian area causing instability of system, high risk of downward trend from any grazing pressure along fence line. Unstable system is reason for downward trend."
East Chaining Spring	287857	4328929	Sunrise	2015	PFC	"Past hoof action from cattle grazing has caused surface and subsurface flow disturbance. Large (24-30") pedestals. Removal of grazing pressure is allowing site to begin recovery."
Unnamed Stream	288146	4329123	Sunrise	2015	PFC	"Lotic area, stream reach below willows is stable and could dissipate high energy storm events. No horse sign observed."
Mud Spring	288113	4336509	Churchill Canyon	2007	NF	"Excessive erosion due to headcutting."
Tapemeck Spring	269709	4337432	Sand Canyon	2000	PFC	"Riparian area popped up with effluent pond coming on-line. No wild horse or livestock sign."
Carson River reach	266192	4335208	Sand Canyon	2000	PFC	"Reach stream type C3 or C4 with a moving stream course." Site location estimated.

Rating key: PFC-NC = Proper Functioning Condition, Not Rated Trend
FAR-NA = Functional-At-Risk, Not Apparent Trend
FAR-UP = Functional-At-Risk, Upward Trend
FAR-DOWN – Functional-At-Risk, Downward Trend
NF = Non-Functional

Appendix C: BLM Sensitive Animals and Migratory Birds That May be Present or Their Habitat May be Present in the HMA.

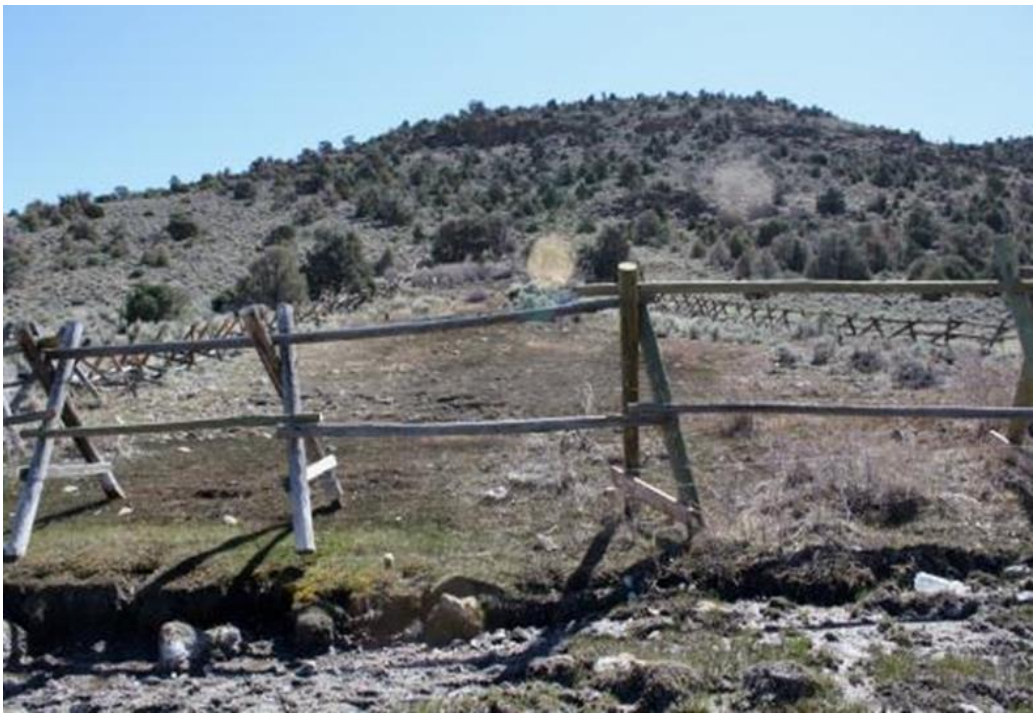
Common Name	Scientific Name	BLM Sensitive Species	BLM Migratory Bird
Big brown bat	*Eptesicus fuscus*	Y	-
Brazilian free-tailed bat	*Tadarida braziliensis*	Y	-
Brewer's sparrow	*Spizella breweri*	Y	Y
Burrowing owl	*Athene cunicularia*	Y	N
California myotis	*Myotis californicus*	Y	-
Dark kangaroo mouse	*Microdipodops megacephalus*	Y	-
Ferruginous hawk	*Buteo regalis*	Y	Y
Fringed myotis	*Myotis thysanodes*	Y	-
Golden eagle	*Aquila chrysaetos*	Y	Y
Greater sage-grouse (Bi-State DPS)	*Centrocercus urophasianus*	Y	N
Green-tailed towhee	*Pipilo chlorurus*	N	Y
Little brown bat	*Myotis lucifugus*	Y	-
Loggerhead shrike	*Lanius ludovicianus*	Y	Y
Long-eared myotis	*Myotis evotis*	Y	-
Long-legged myotis	*Myotis volans*	Y	-
Mourning dove	*Zenaida macroura*	N	Y
Northern goshawk	*Accipiter gentilis*	Y	N
Pale kangaroo mouse	*Microdipodops pallidus*	Y	-
Pallid bat	*Antrozous pallidus*	Y	-
Pinyon jay	*Gymnorhinus cyanocephalus*	Y	Y
Sage sparrow	*Amphispiza belli*	N	Y
Sage thrasher	*Oreoscoptes montanus*	Y	Y
Swainson's hawk	*Buteo swainsoni*	Y	N
Townsend's big-eared bat	*Corynorhinus townsendii*	Y	-
Virginia's warbler	*Vermivora virginiae*	N	Y
Western pipistrelle bat	*Pipistrellus hesperus*	Y	-
Western small-footed myotis	*Myotis ciliolabrum*	Y	-
Yuma myotis	*Myotis yumanensis*	Y	-

Appendix D. Riparian and Upland Grass Photos.

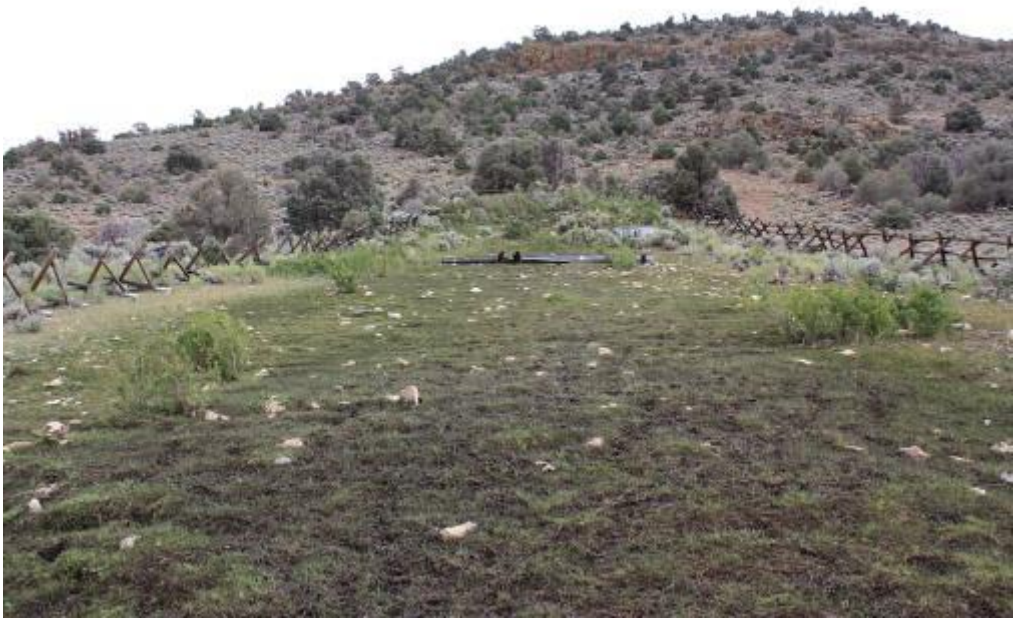
Water sources are limted within the Clifton, Mill Canyon and parts of Eldorado Canyon allotments portion of the HMA. Water flows at these sources have greatly deminished over at least the past 40-years. For instance, at one time Hazlett Spring supported a pipeline and trough system, the current flow is much less than one gallon per minute. Dangberg Spring also previously suppoted a pipeline and at least one trough, the current flow is near one gallon per minute. As recently as 1990, Rush Spring supported a large pool of water, the current flow is much less than one gallon per minute. Very low flow volumes at most of the springs in the Clifton Allotment portion of the HMA, often force horses to linger for hours in order to sip water as depressions slowly fill.

When horses are loitering at water sources, sometimes for hours, wildlife will not approch which increases stress on wildlife species. Large mammals within the HMA include pronghorn, mule deer, black bear, mountain lion, bobcat, and coyotes.

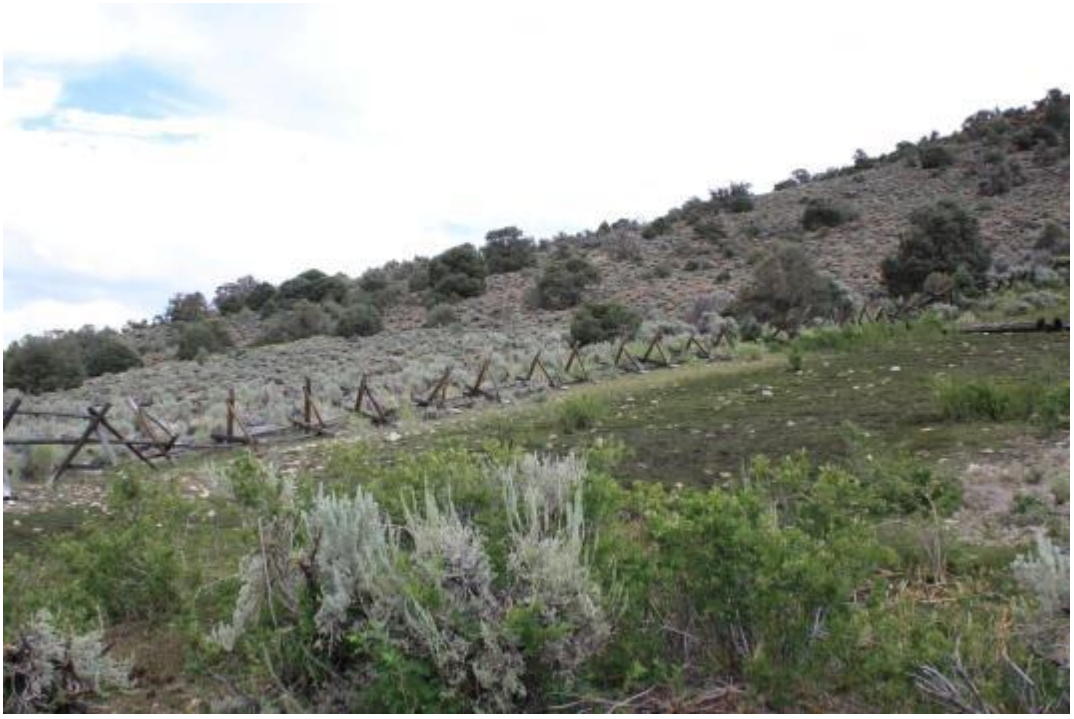
West Barton Spring, Clifton Allotment: The exclosure fence was repaired in the fall of 2014, and knocked down or vandalized during the winter of 2014/2015. When horses were excluded much of the riparian vegetation was 20 plus inches in height. Continual over use will result in the loss of the more palitable plant species which are important to wildlife. As the more palitable speces are grazed the less palitable species and noxious weeds tend to dominate these sites reducing or eliminating wildlife habitat.



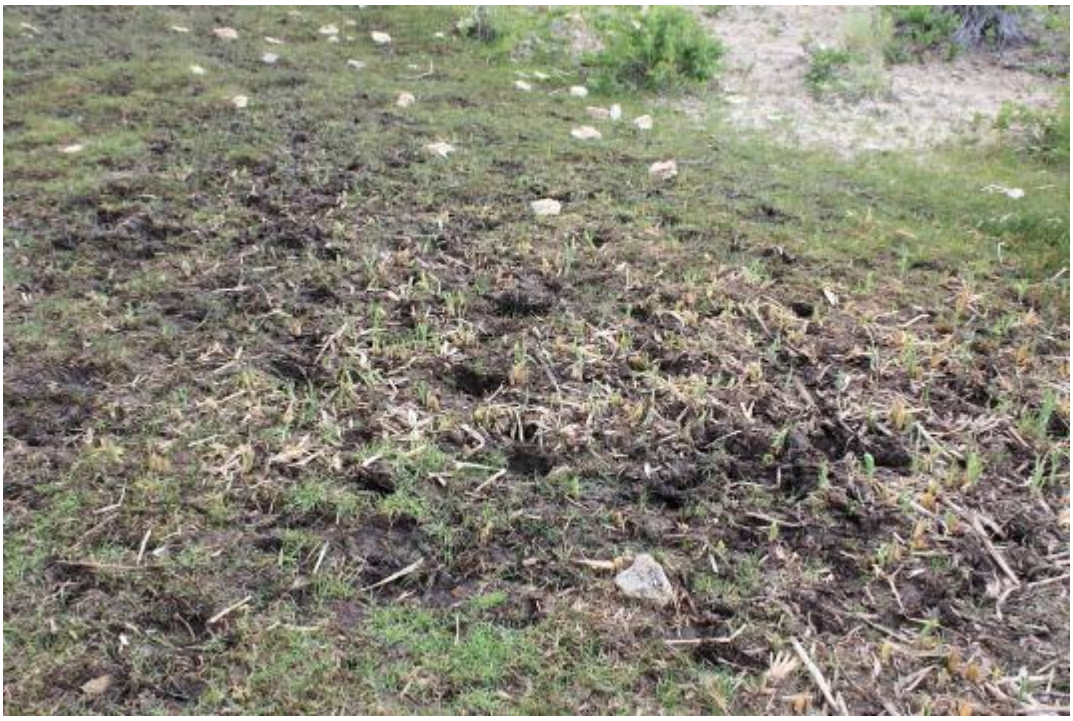
West Barton Spring, May 11, 2015



West Barton Spring, July 21, 2015



West Barton Spring, July 21, 2015.



West Barton Spring, July 21, 2015

West Barton Spring, 2001.

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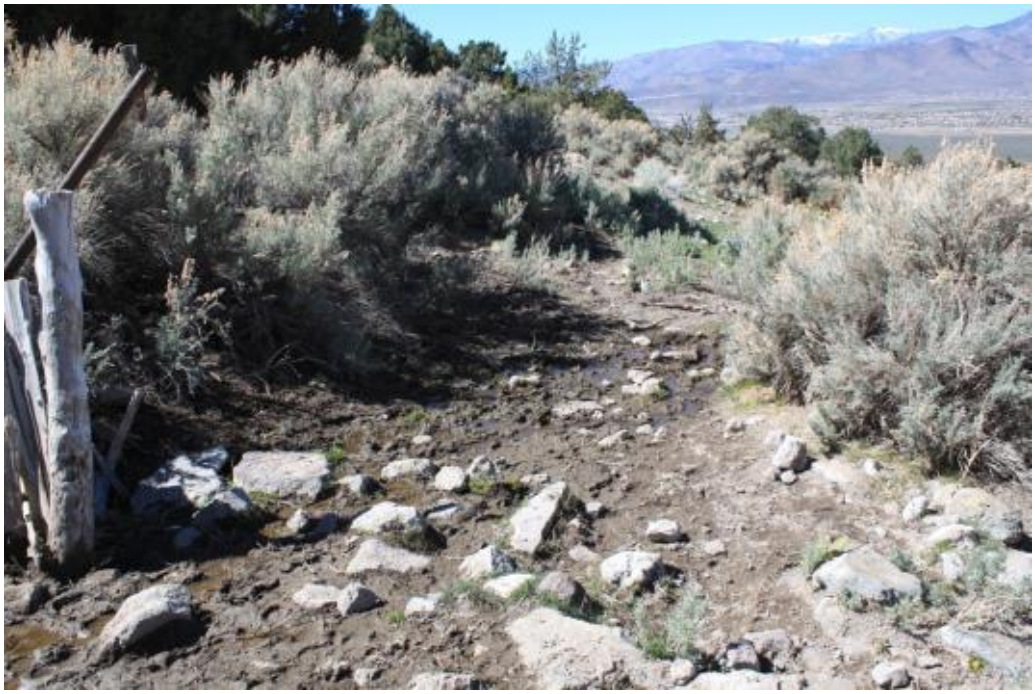
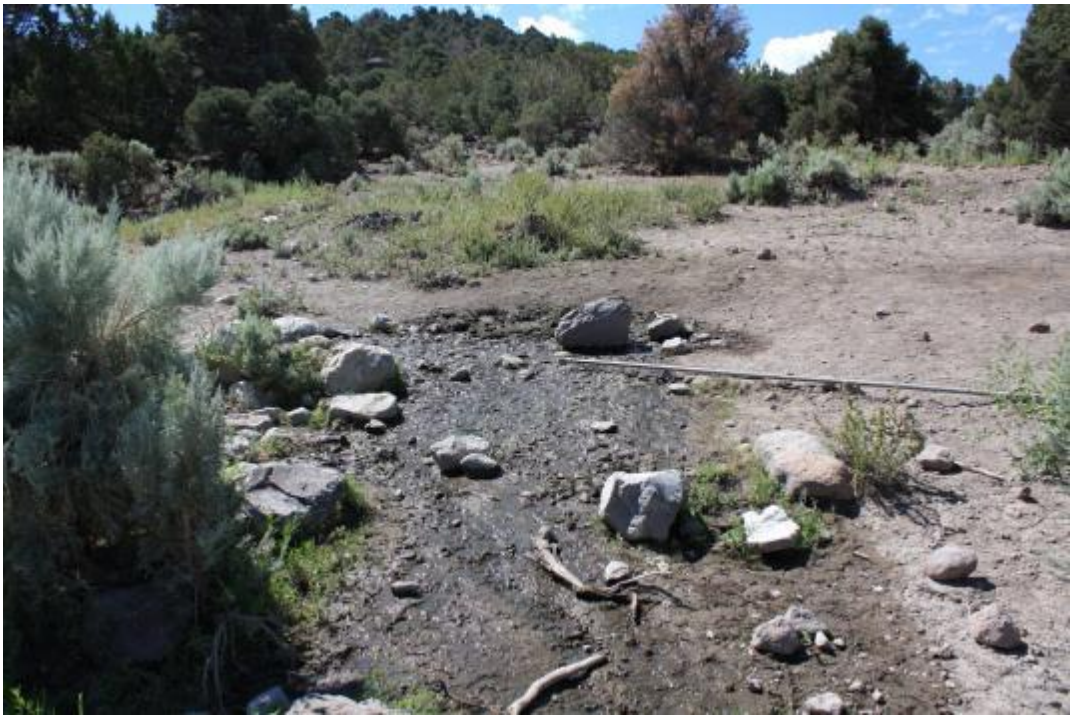
Dangberg Spring, Clifton Allotment: over use by wild horses has resulted in the loss of most riparian plant species and the compaction of soils which can result in lower water flow rates and in some cases the loss of a spring.

Dangberg Spring, January, 2015.



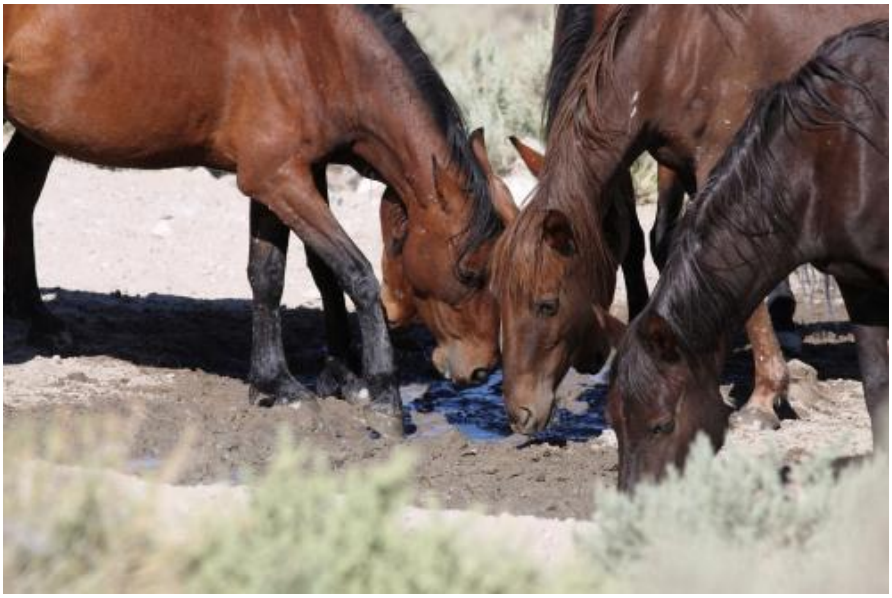
Dangberg Spring, March, 2015.

Dangberg Spring, July 21, 2015.



Dangberg Spring, July 21, 2015.

Egus Spring, Clifton Allotment: Over use by wild horses has removed all riparian vegetation and compacted the soil. The current flow is less than one gallon per minute. During the summer bands of wild horses will often spend hours waiting to obtain enough water due to the very low flow of this spring. In 1988 the water flow was greater. In 1988 more riparian vegetation was present. Wildlife undergo stress as they cannot obtain water while the horses wait for the small depressions to fill.



Egus Spring July 2013.

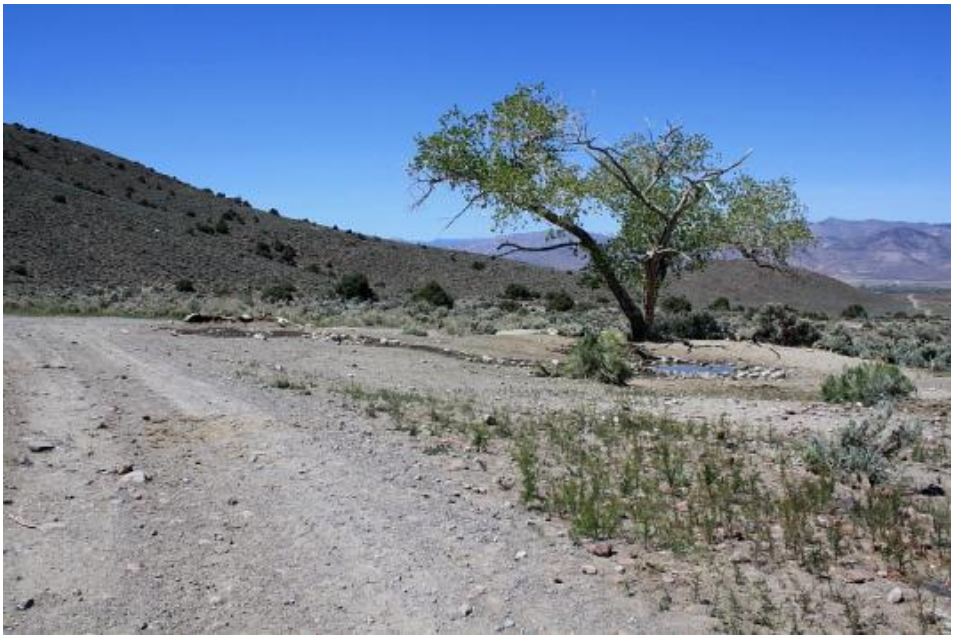
Egus Spring July 2013. A second band of horses waiting for the first band of horses to leave the seep. This is one of many low producing seeps in the area, horses may wait hours in the summer for water. Fights between horses are not uncommon in these situations and often the stallions force their band to leave the spring before all of the animals have had an adequate drink. Wildlife undergo stress as they cannot obtain water while the horses wait for the small depressions to fill.

Egus Spring August 1, 1988.

Egus Spring August 1, 1988. Egus Spring in 1988, showed a substantial departure from a healthy spring and riparian system. Continual over use has now removed all of the riparian vegetation and led to the loss of the finer soils. Water flow has substantially decreased, which could be attributable to compaction of the soil from hoof action, dewatering of the area from ground water pumping, climate change or some other factor.

Hazlett Spring, Clifton Allotment: over use by wild horses has removed all riparian vegetation and compacted the soil. The flow volume has decreased substantially over the past decades, at one time this spring feed a pipeline and trough system, the current flow is less than one gallon per minute. During the summer bands of wild horses will often spend hours waiting to obtain enough water due to the very low flow of this spring. Wildlife undergo stress as they cannot obtain water while the horses wait for the small depressions to fill.

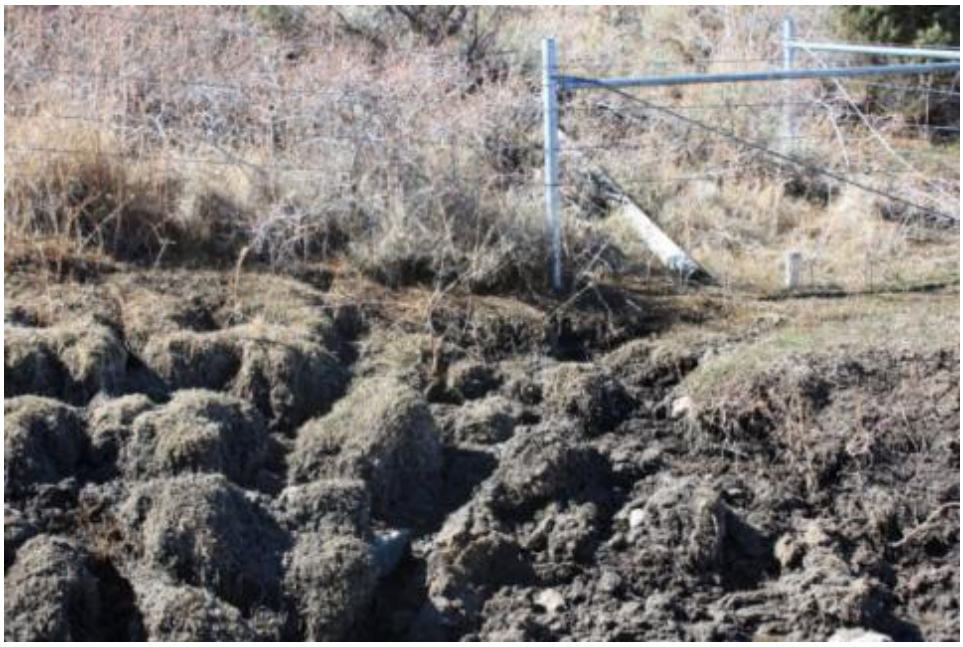
Hazlett Spring, September 2013.



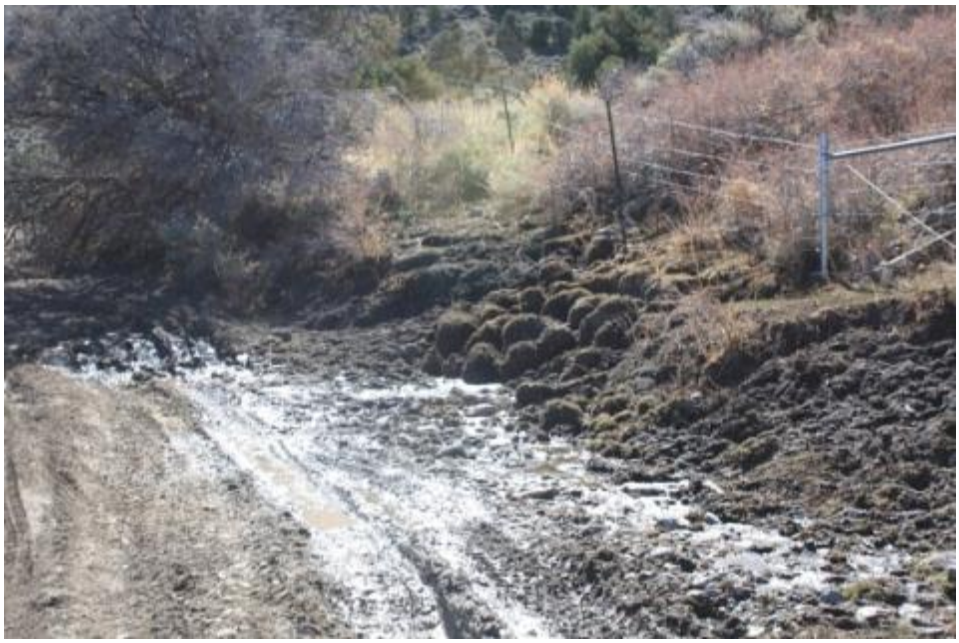
Hazlett Spring, April 2014.

Hazlett Sprint, August 1988. Water flow and availability has substantially decreased since 1988. This is the lower pool that will occasionally fill in the winter, however, during the summer months the small trickle of water rarely even reaches this pool.

Hercules Spring, Clifton Allotment: There are usually three but sometimes four seeps in the immediate area. Over use by wild horses has removed almost all riparian vegetation and compacted the soil from two of the three seeps, the third still supports willows. The flow volume has decreased, the current flow is less than one gallon per minute at each seep. During the summer bands of wild horses will often spend hours waiting to obtain enough water due to the very low flow of these seeps. Wildlife undergo stress as they cannot obtain water while the horses wait for the small depressions to fill. Within the exclosure riparian vegetation is healthy and providing habitat for wildlife species, outside of the exclosure the riparian soils have been severely impacted by excessive hoof action and are being lost. There are two springs within a short distance of each other, the first two pictures show the one above the road and the second set of pictures show the one a short distance below the road. There is another seep a short distance away that supports willows, however, surface water is often absent.



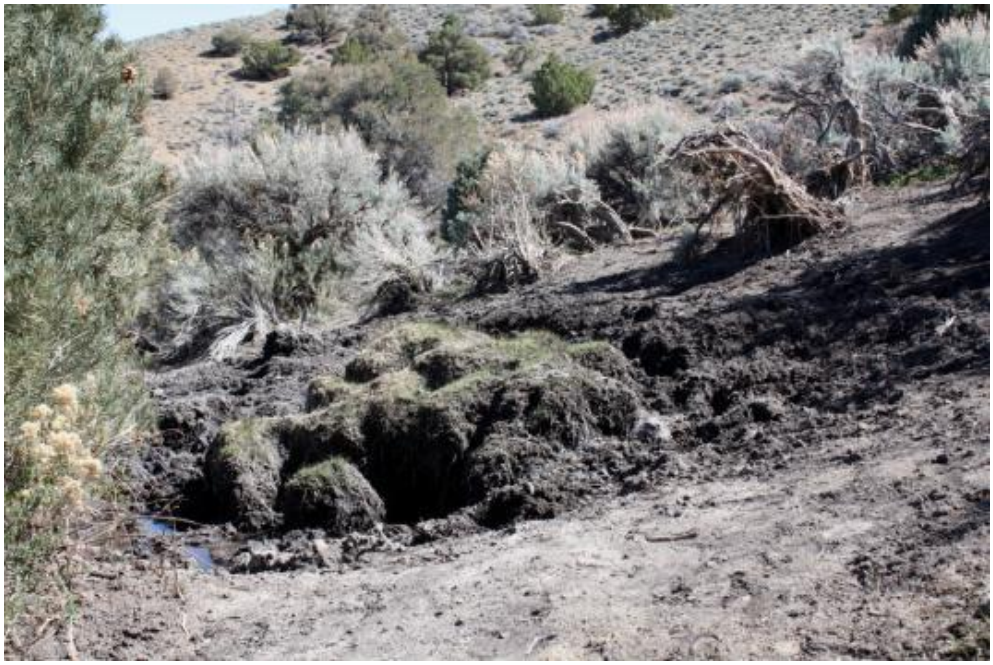
Hercules Spring, March, 2014

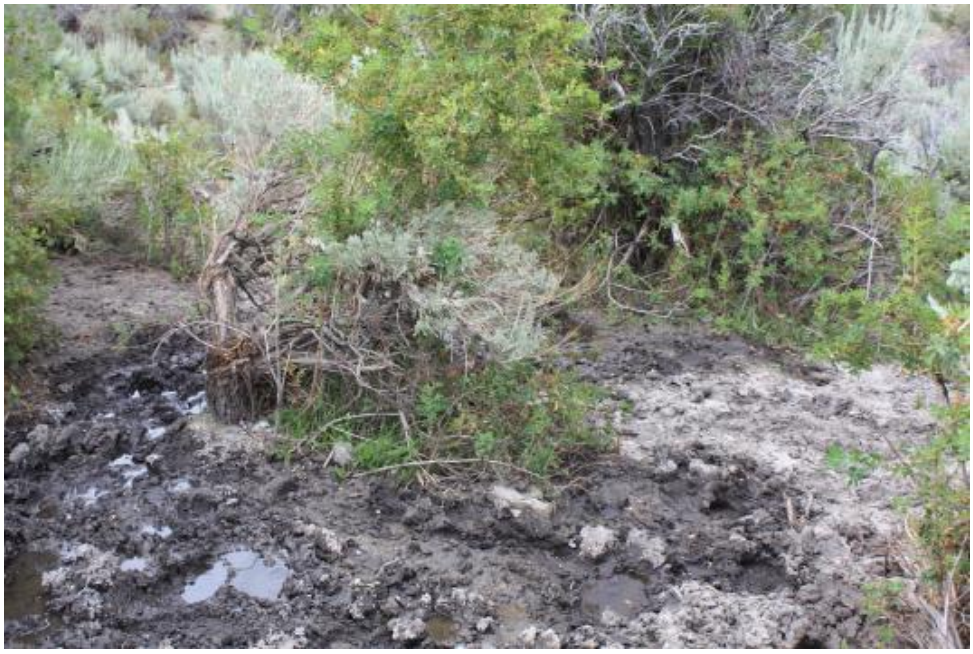


Hercules Spring, March, 2014

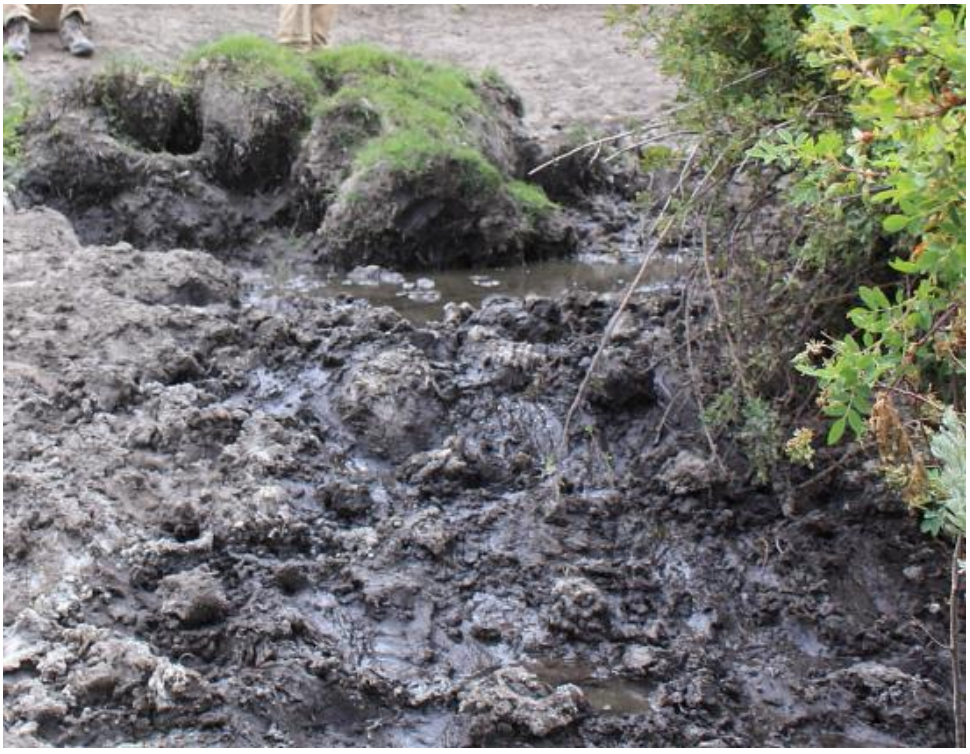
Hercules Spring, June 14, 2014.

Hercules Spring, July 10, 2014.


Hercules Spring, July 21, 2015.



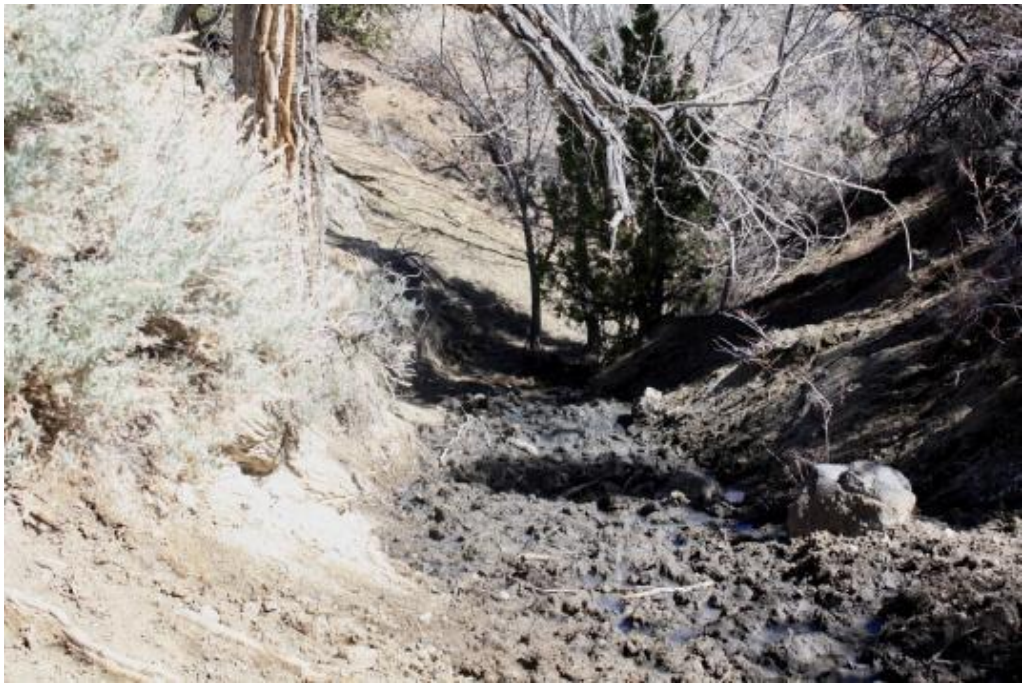
Hercules Spring, July 21, 2015.



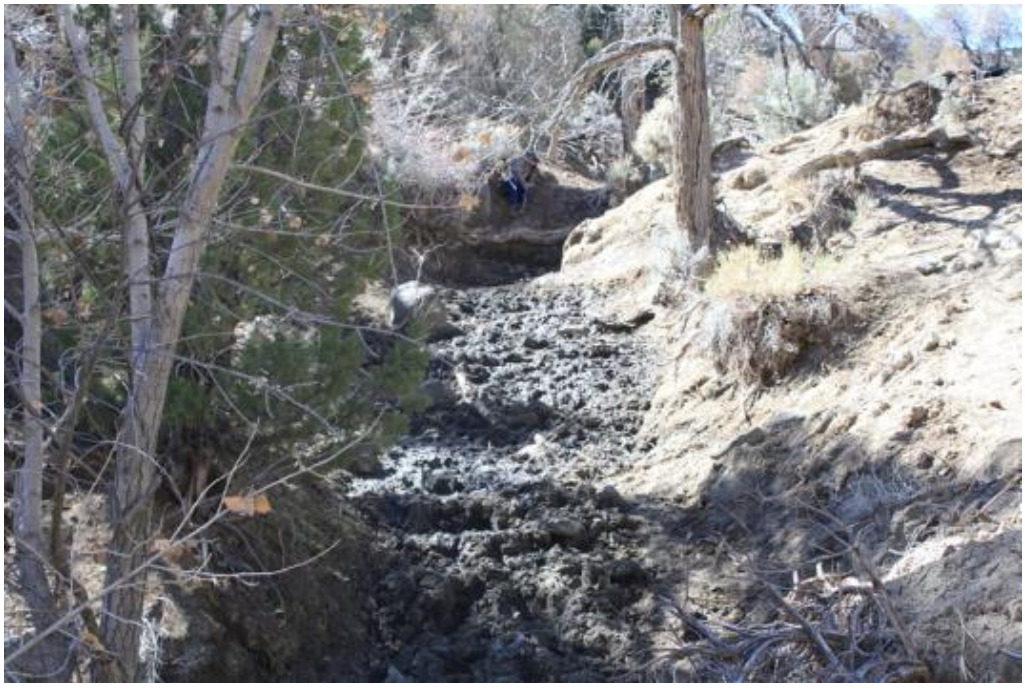
Hercules Spring, July 21, 2015.

Hercules Spring, August 2001. Since 2001, water flow and extent of saturated soils has decreased substantially.

Lower Hercules Spring, Clifton Allotment: over use by wild horses has removed almost all riparian vegetation except for a few mature cottonwood trees, and compacted the soil. The flow volume has decreased, the current flow is less than one gallon per minute. During the summer bands of wild horses will often spend hours waiting to obtain enough water due to the very low flow of this spring. Wildlife undergo stress as they cannot obtain water while the horses wait for the small depressions to fill.



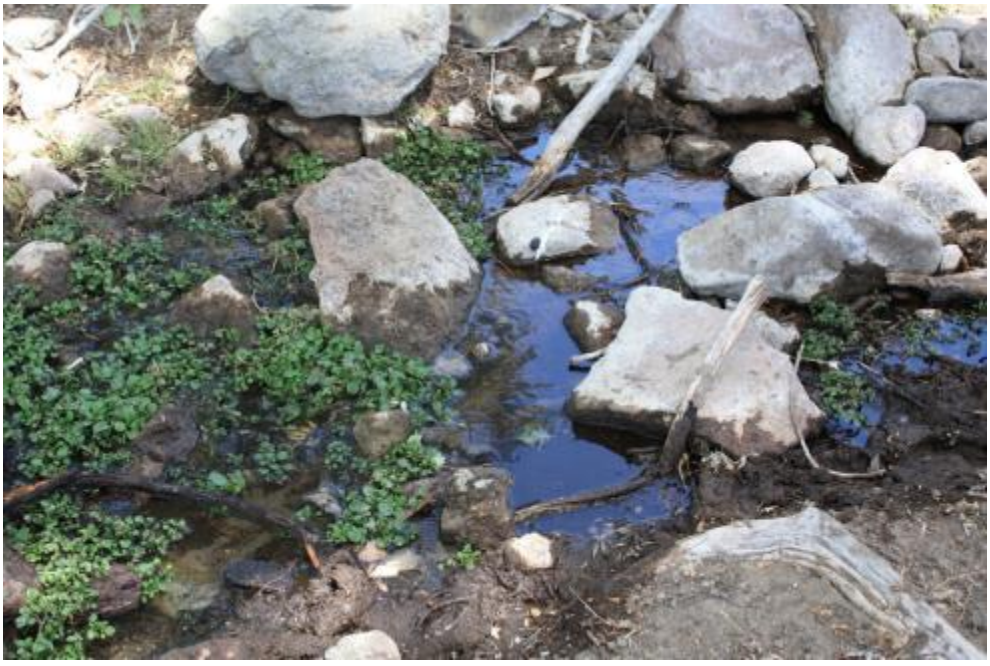
Lower Hercules Spring, March, 2014.



Lower Hercules Spring, March, 2014.

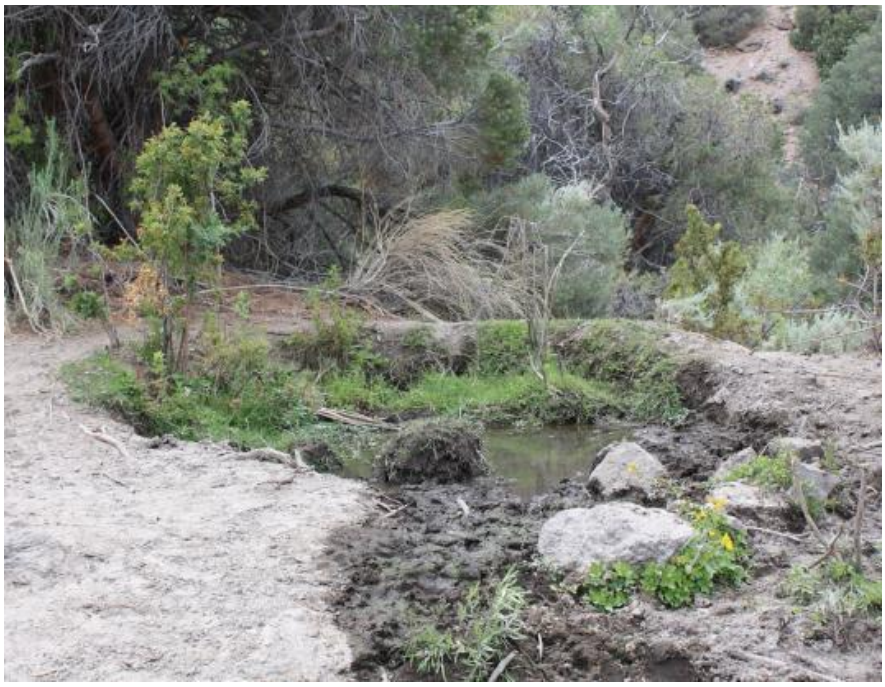
Nuttles Pool, and Creek Clifton Allotment: This pool and nearby creek provide adequate water for the wild horses in this area. All of the riparian vegetation has been removed from the area sounding the pool except for one willow tree. Many sections of the creek retain riparian vegetation and the flow is adequate for the wild horses in the immediate area.

Nuttles Pool, June 18, 2014.

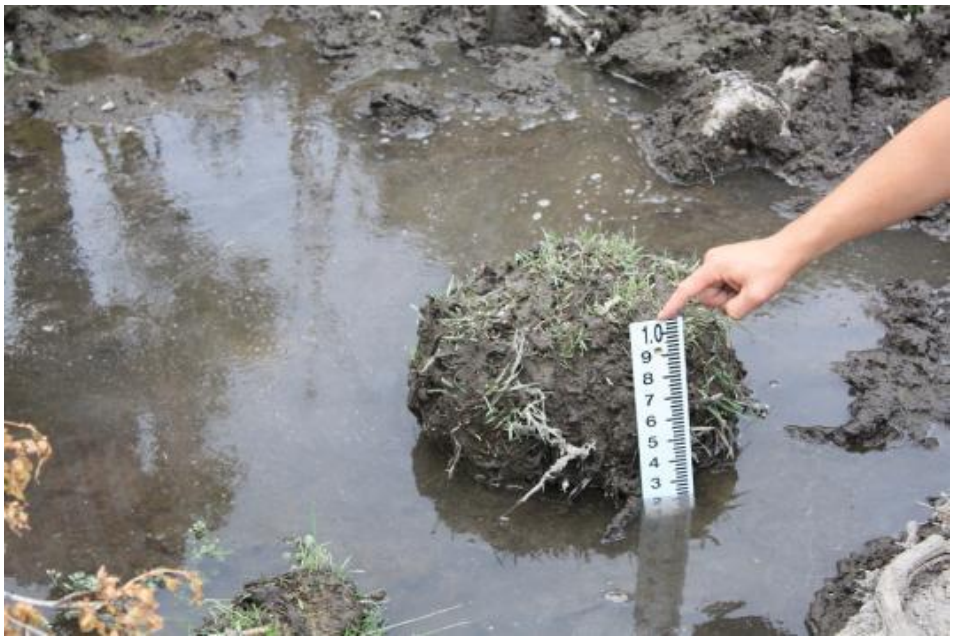


Nuttles Creek, June 18, 2014.

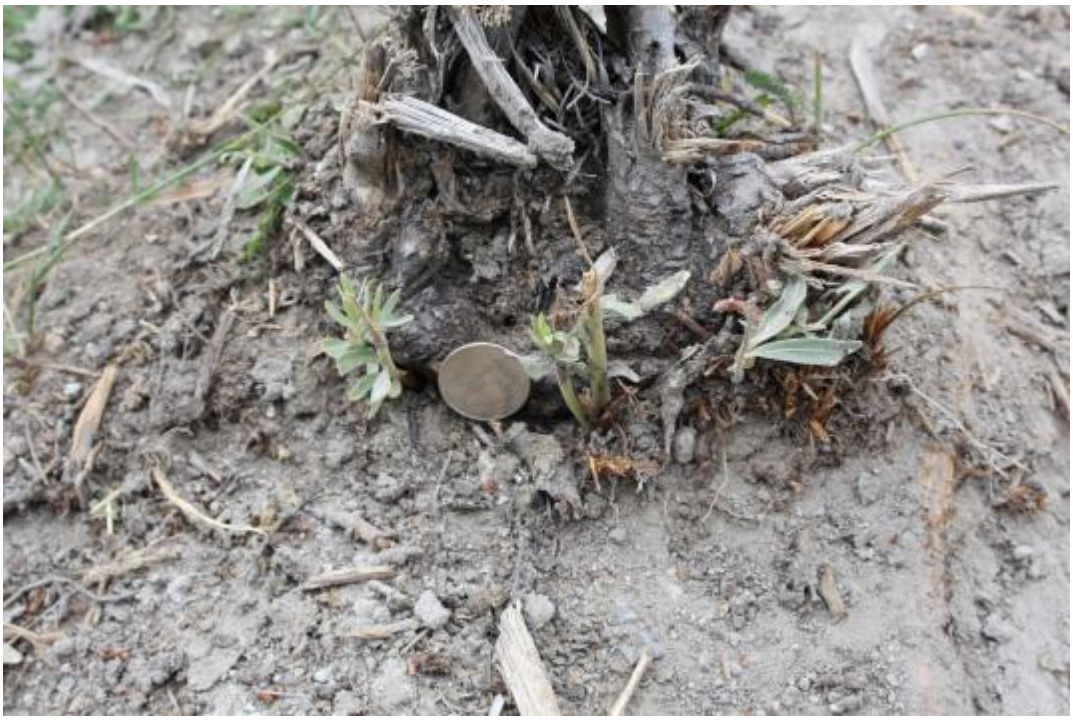
Pine Spring, Clifton Allotment: over use by wild horses has removed most of the riparian vegetation except for a few mature willow trees, and several species of aquatic plants. Over use by wild horses is preventing recruitment of willows. The soil has been compacted and a pedestal formed in the spring. The flow volume is less than one gallon per minute.



Pine Spring, July 21, 2015.



Pine Spring, July 21, 2015.

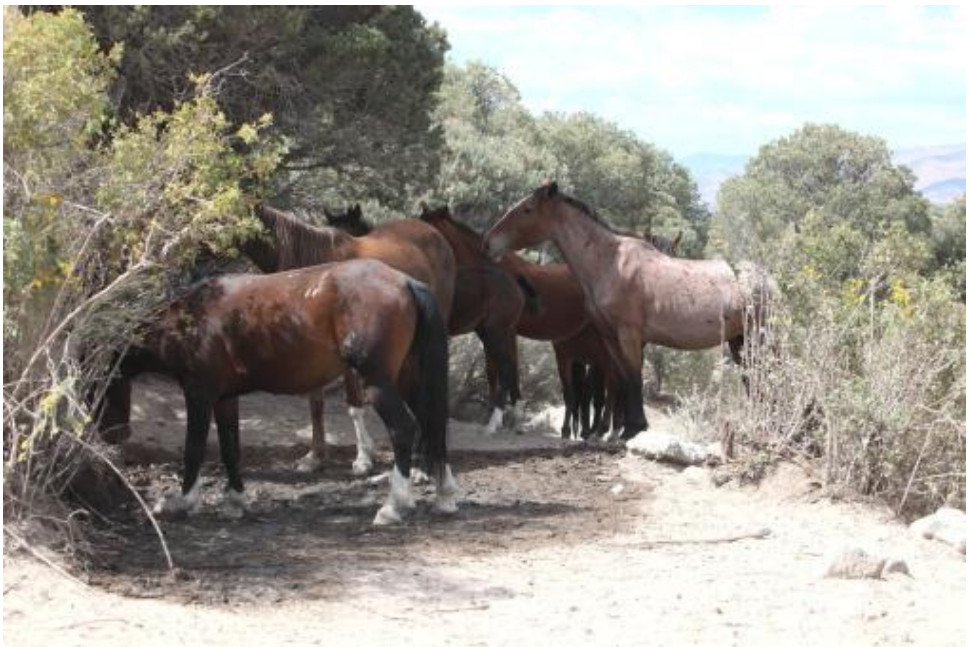


Pine Spring, over used willow, will likely eventually die, July 21, 2015.

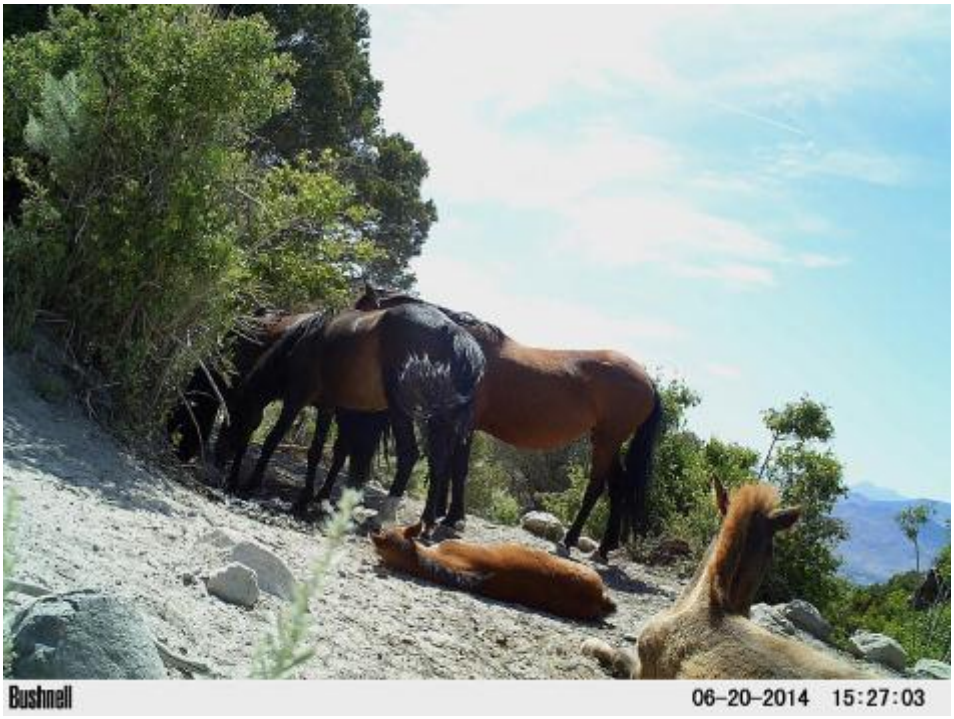
Pine Spring May, 1978.

Rose Spring, Clifton Allotment: over use by wild horses has removed all riparian vegetation and compacted the soil. Some wild roses, remain, however, are not considered riparian vegetation. The flow volume is less than one gallon a minute. During the summer bands of wild horses will often spend hours waiting to obtain enough water due to the very low flow of this spring. Wildlife undergo stress as they cannot obtain water while the horses wait for the small depressions to fill.

Rose Spring, September 12, 2013.

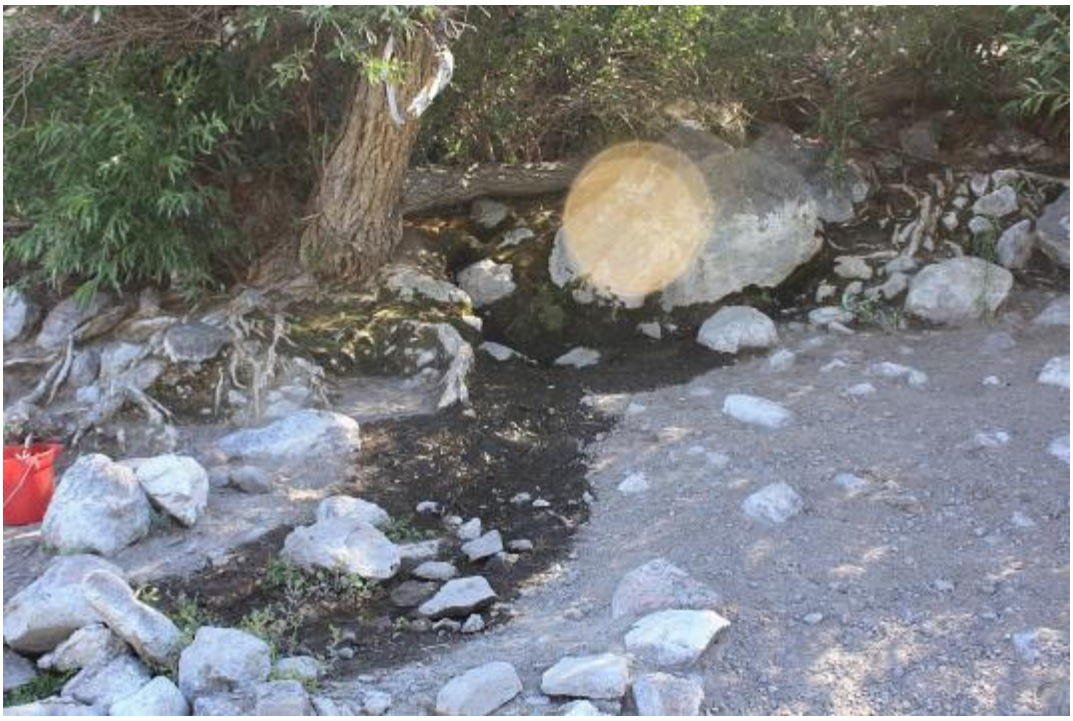


Rose Spring, September 12, 2013, horses waiting to obtain water as the seep slowly fills a depression.

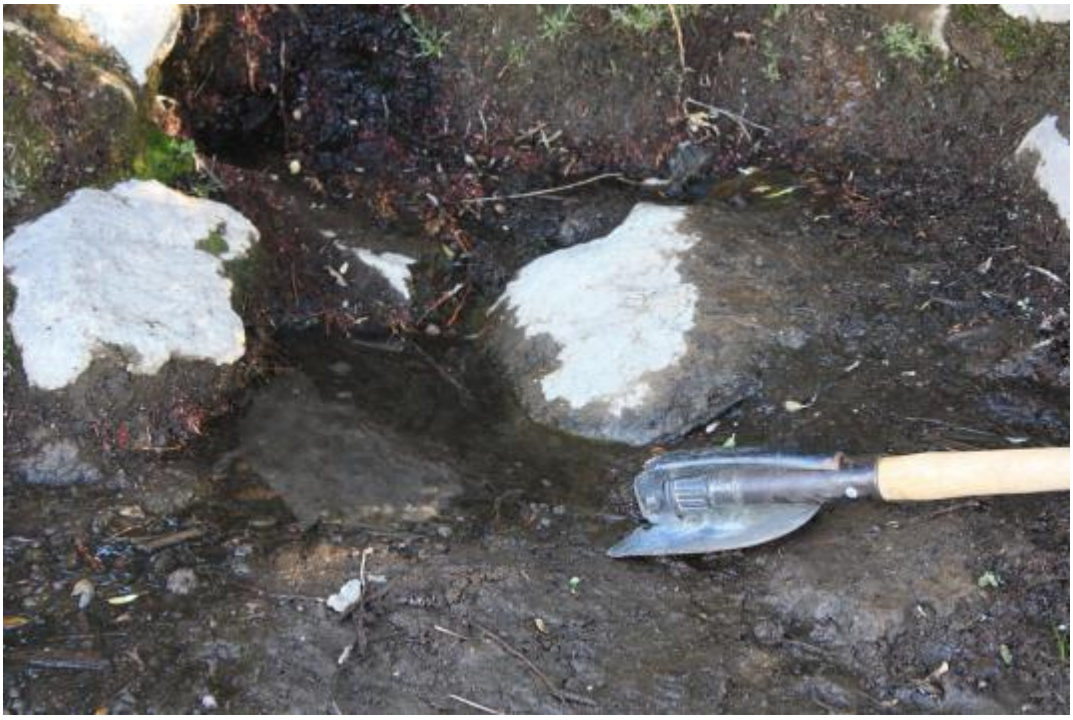


Rose Spring, June 20, 2014, horses waiting to obtain water as the seep slowly fills a depression.

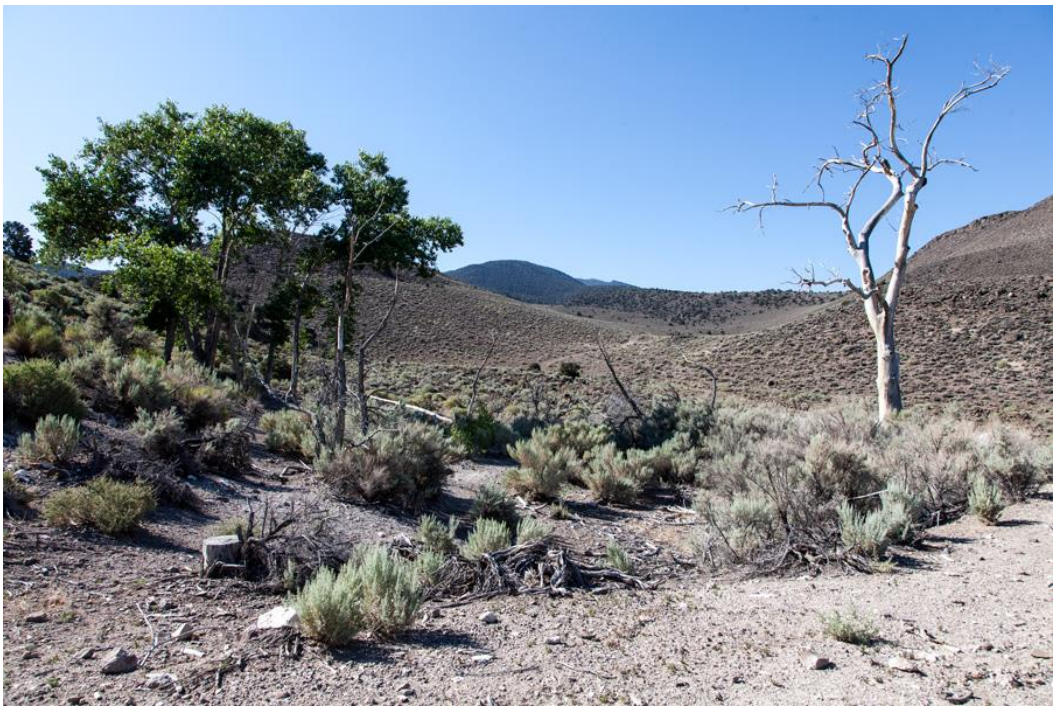
Rush Spring, Clifton Allotment: over use by wild horses has removed all riparian vegetation except for some mature willow and cottonwood trees. The soils have been compacted by overuse. In the 1980s there was a large pool associated with this spring, however, flow volume has decreased to less than one gallon a minute.



Rush Spring, July 21, 2015, current extend of Rush Spring, formally supported a pond.



Rush Spring, July 21, 2015.

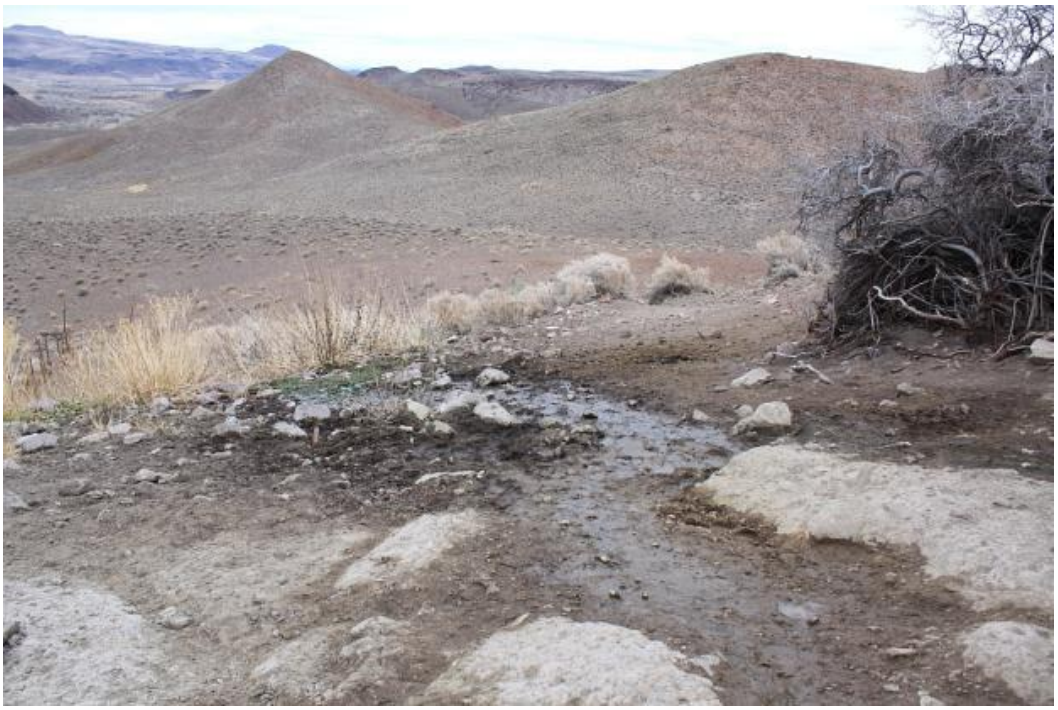


Rush Spring, July 21, 2015, The depression filling most of the foreground was the pond, now supporting sagebrush.

Rush Spring May, 1990. This large pool has been complety dry for at least the past five years and the flow is now substantially less than one gallon per minute.

Rush Spring, May 1990, a portion of the pool is visible in the upper right.

Urrutia Spring, Clifton Allotment: over use by wild horses has removed all riparian vegetation thistles are becoming established. The soils have been compacted by overuse.



Urrutia Spring, February 3, 2015.

Urrutia Spring,1990.

Water availability has decreased sustainably at most or all springs in the northern portion of the HMA, with many springs completely drying up and others with substantial decreases in flow volume. The cause of this is unknown, however, possibilities include pumping of ground water by the neighboring communities may have led to the decreased flow, compaction of the soils by hoof action can also lead to diminished flow or complete spring loss especially in smaller systems. By adjusting the horse numbers to the established AML by grazing allotment pressure will be reduced on many of the riparian areas however, the small areas may require fencing for conditions to improve as the hoof action of a few horses concentrated in a small area can continue to compact soil.

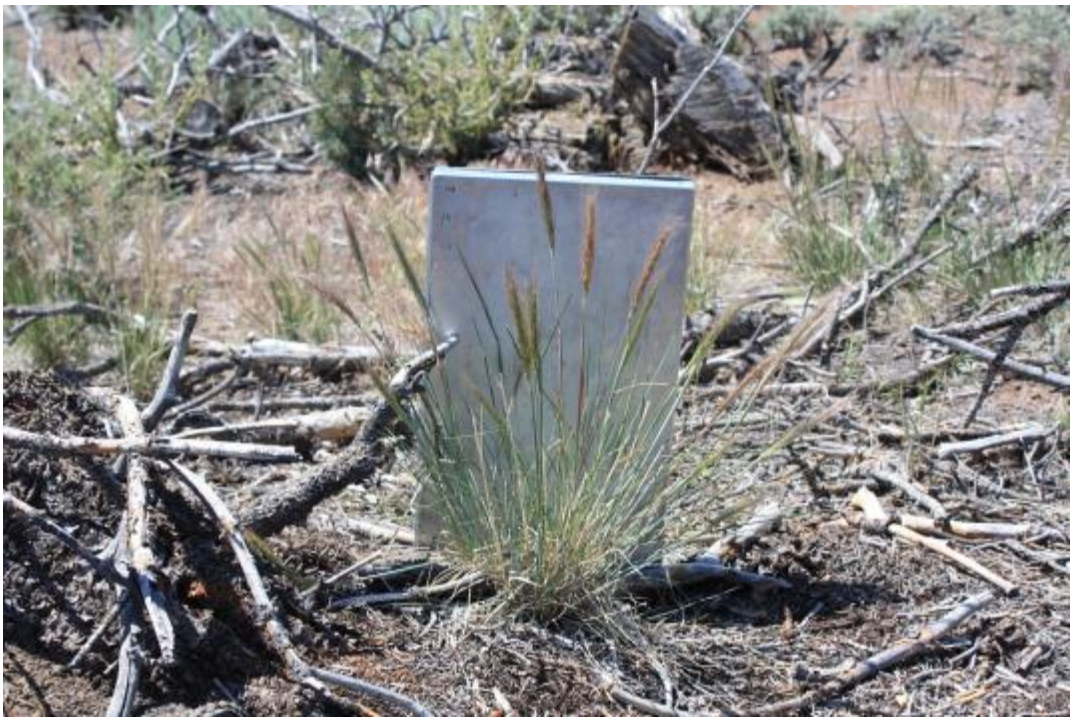
Vegetation

Native bunch grasses are very vulnerable to overgrazing, they did not evolve under continual grazing. Native bunch grasses reproduce by seed which requires that enough carbohydrates be transferred to the roots in order to produce seeds, and that the plants are allowed to release mature seeds before the seed heads are consumed by herbivores. Also native bunch grass plants will eventually die if they are annually subjected to heavy grazing during their growing season. It is for these reasons that it is critical that the native bunch grasses are not subjected to excessive grazing. Once the native bunch grasses are lost it can take many decades of very little or no use for them to become re-established on arid ranges.

Over the long run more grazing animals can be maintained if the plant community is healthy. An analogy would be a savings account. If someone only withdrew the interest on the account the account would last forever, if however they started to withdraw some of the savings their interest would diminish and if they withdrew enough of their savings they would eventually have very little interest or even savings. This is akin to what happens on the range if the plants are maintained in a healthy condition, many more grazing animals can be support over the long-term as there are more healthy plants producing much more forage than fewer less healthy plants on an overgrazed range. An overgrazed range will eventually only be able to support a fraction of the grazing animals as it did when it was healthy. A degraded range can take many decades of little or no use to recover. Due to decades of overuse the northern portion of this HMA can only support about half of the grazing use as it could in 1995.

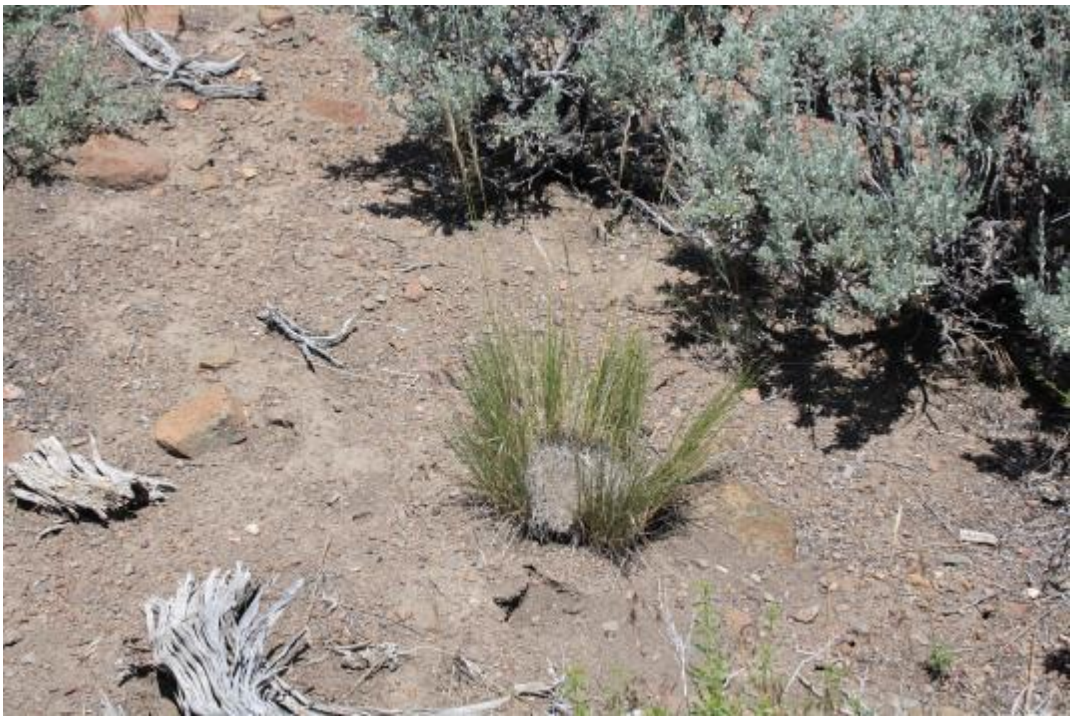
The first series of pictures are of bunch grasses from slightly grazed areas within the HMA, these are healthy bunch grasses capable of reproducing and sustaining themselves. These slightly grazed grasses have had less than ten percent of the plant material removed annually.

Indian rice grass, Buckeye Canyon Allotment, July 2, 2015

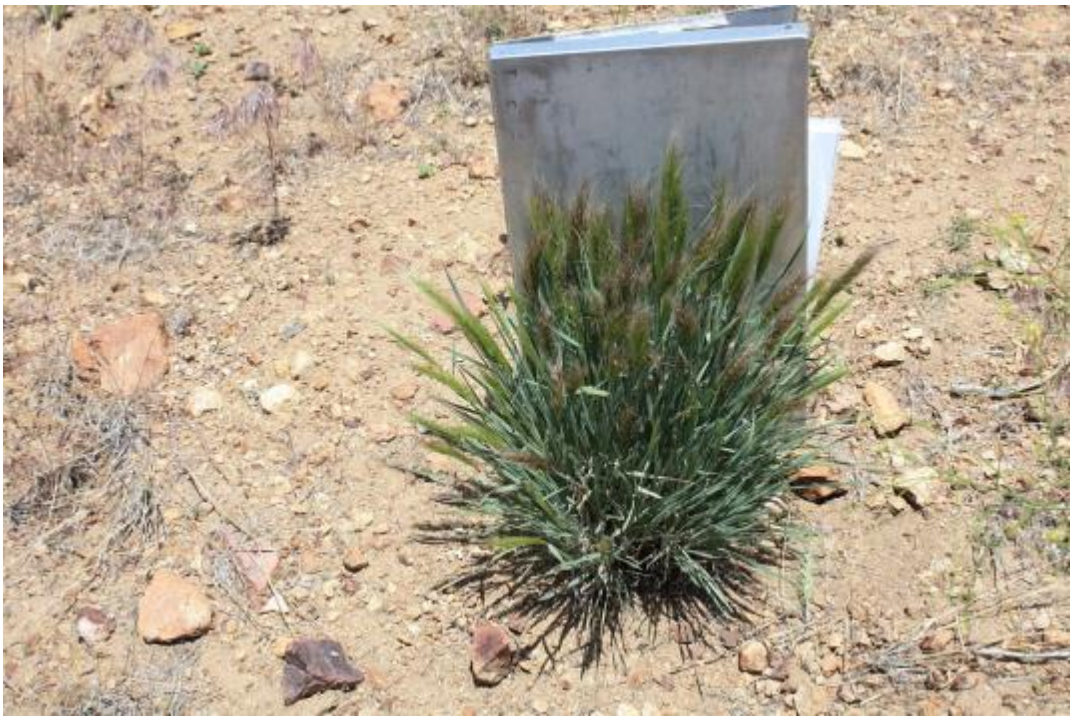


Squirreltail, Churchill Canyon Allotment, July 2, 2015.

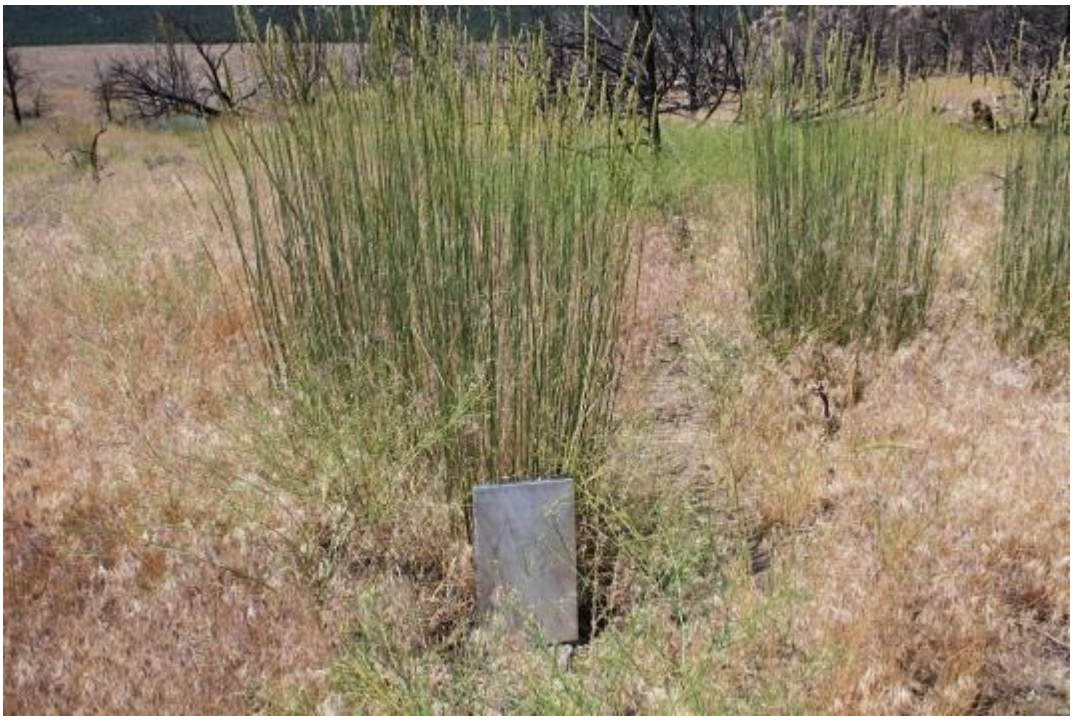
Squirreltail, Rawe Peak Allotment, May 14, 2015.



Needlegrass, Rawe Peak Allotment, July 2, 2015.

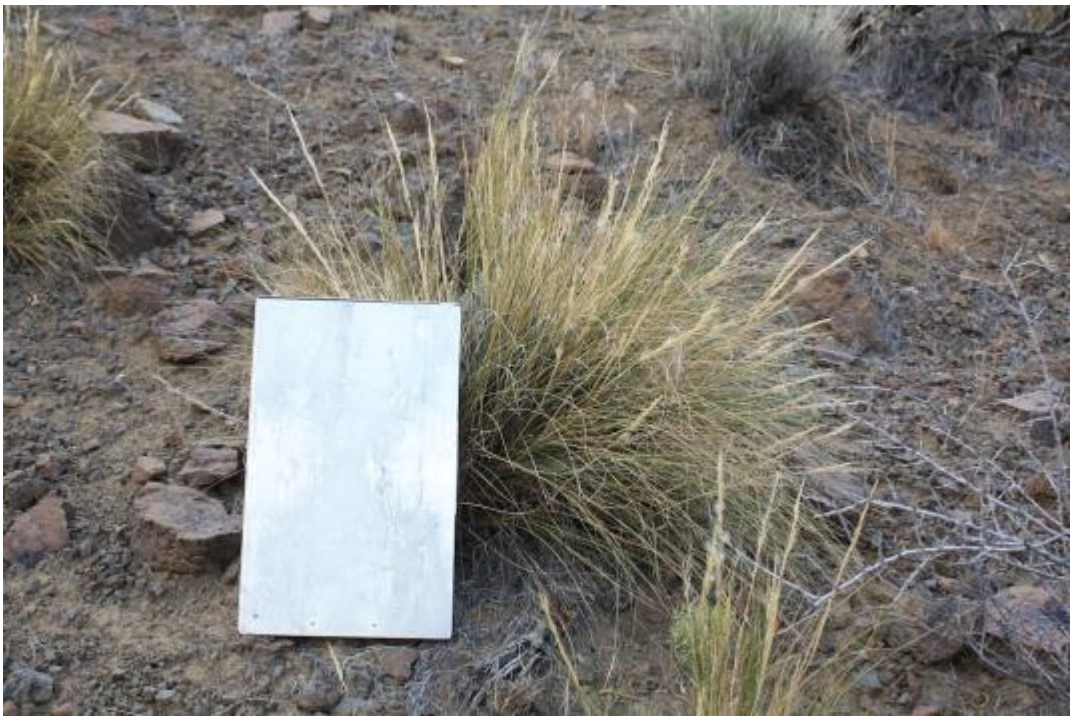


Squirreltail, Rawe Peak Allotment, July 2, 2015.



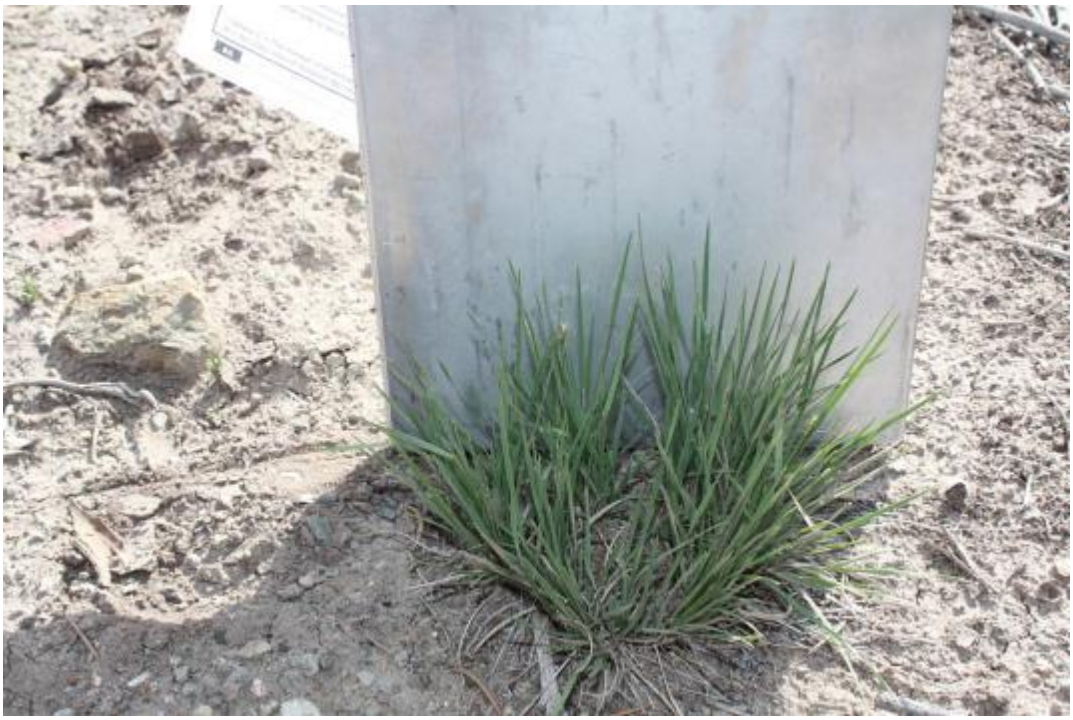
Great Basin wild rye, Rawe Peak Allotment July 2, 2015.

Needlegrass, Sand Canyon Allotment, July 2, 2015.



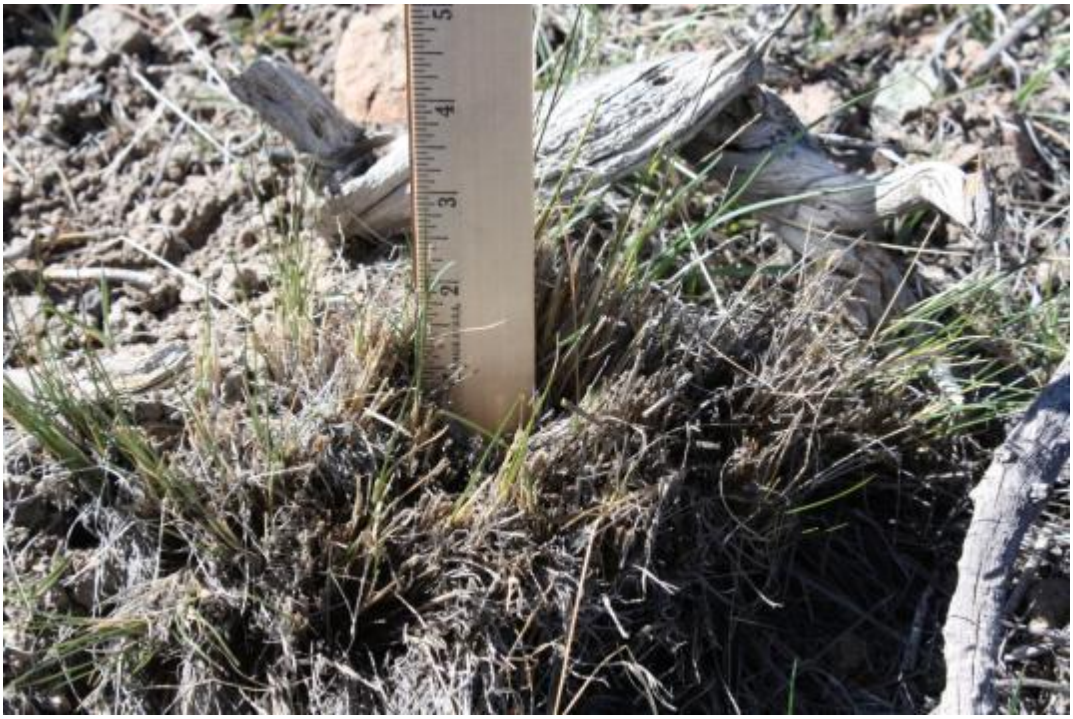
Needlegrass, Sand Canyon Allotment, July 2, 2015.

Indian rice grass, Sand Canyon Allotment, July 2, 2015.

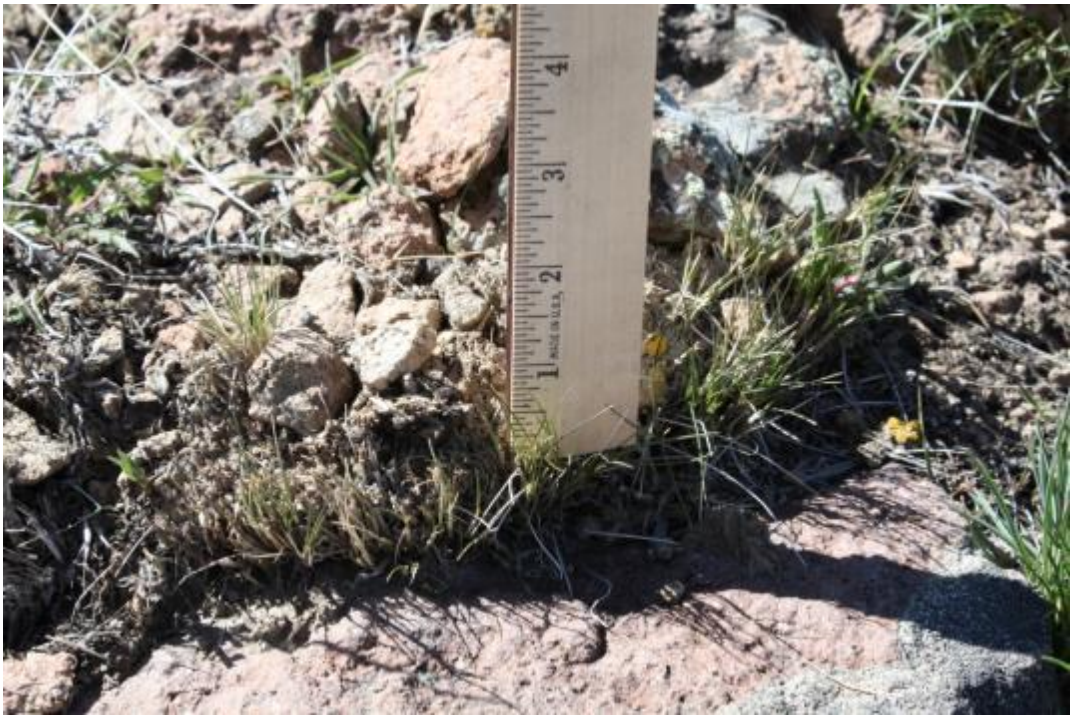


Squirreltail, Sunrise Pass Allotment July 2, 2015.

When native bunch grasses are over used, they will lose vigor and if the over use is at a sufficient level and duration they will eventually die and may be replaced by less palatable species or noxious weeds. The following are pictures of over used grasses within the HMA.

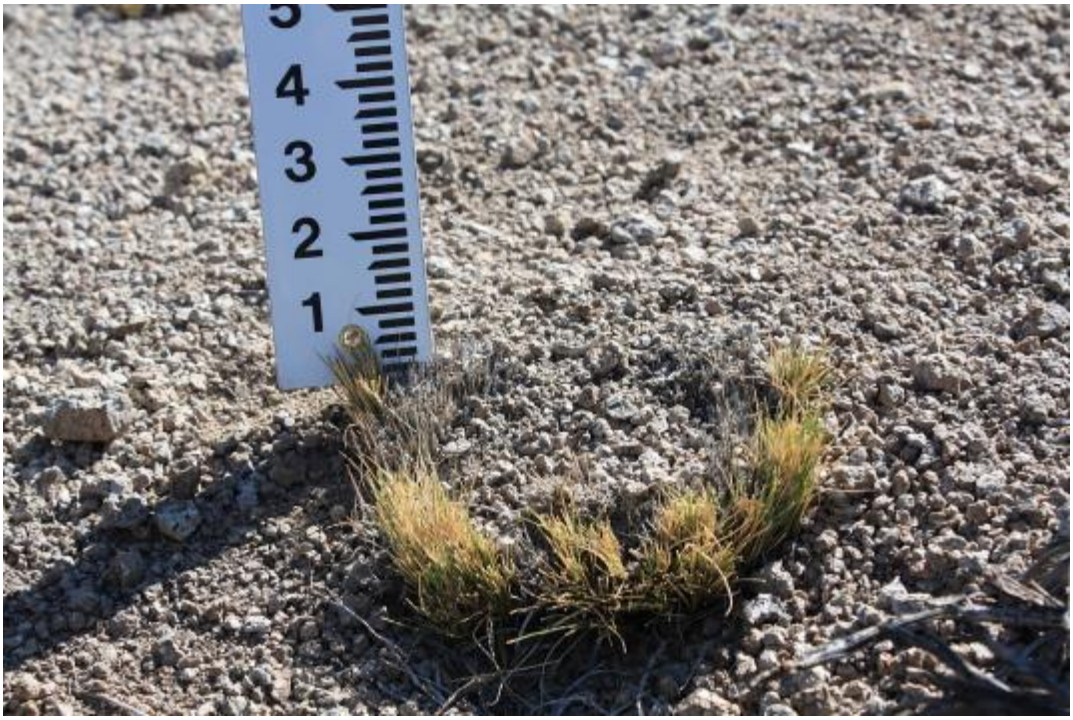


Over used Indian rice grass in Clifton Allotment, March 19, 2015.

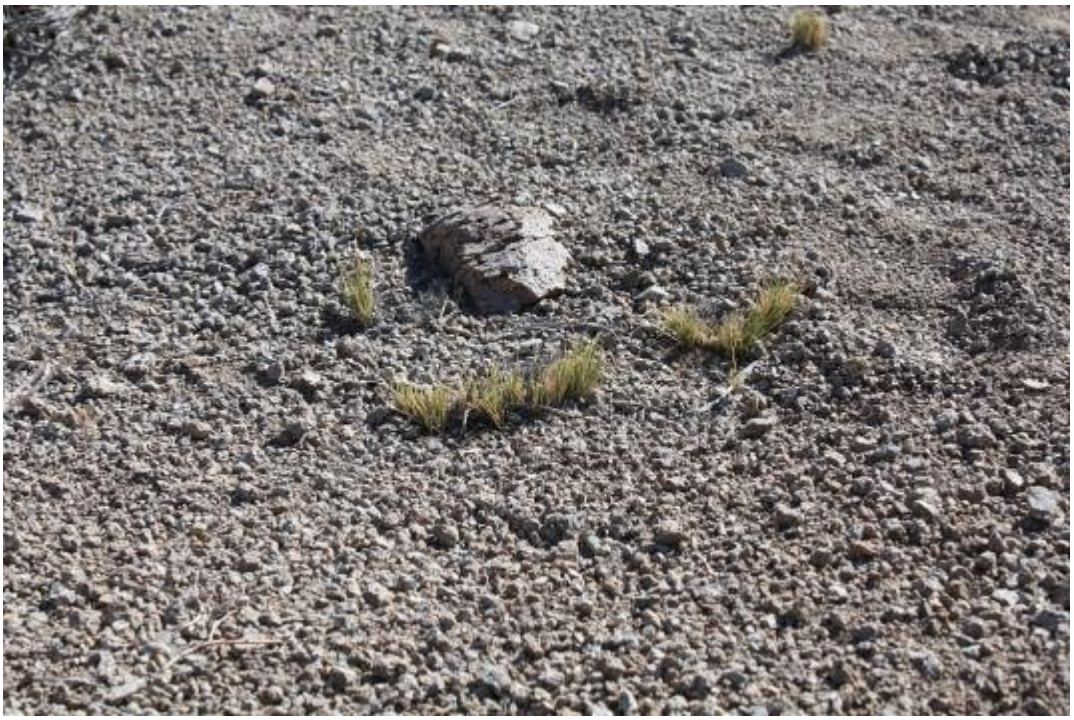


Over used *Poa*, Clifton Allotment, March 19, 2015.

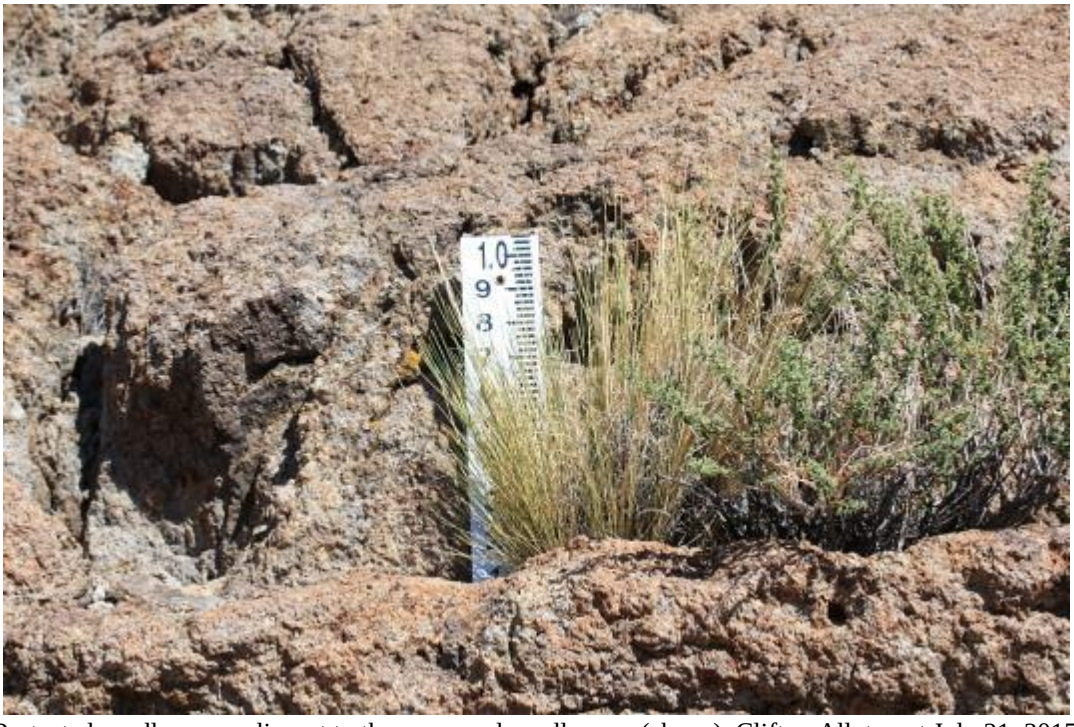
Over used needlegrass in Clifton Allotment March 26, 2015.



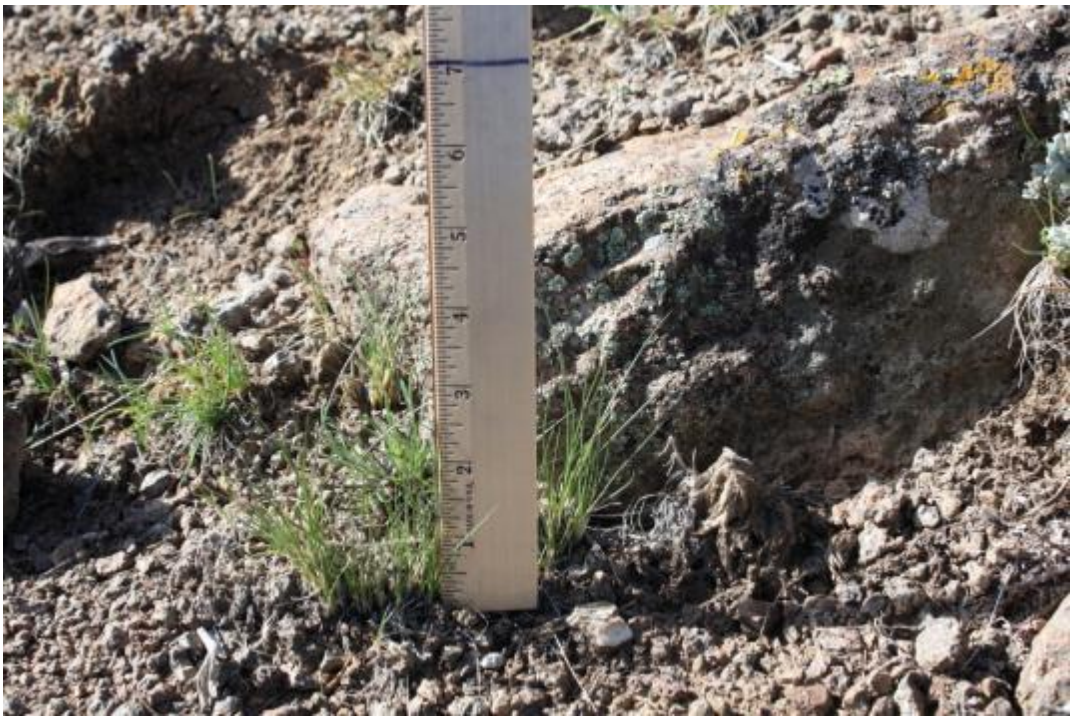
Over used needlegrass in Clifton Allotment July 21, 2015.



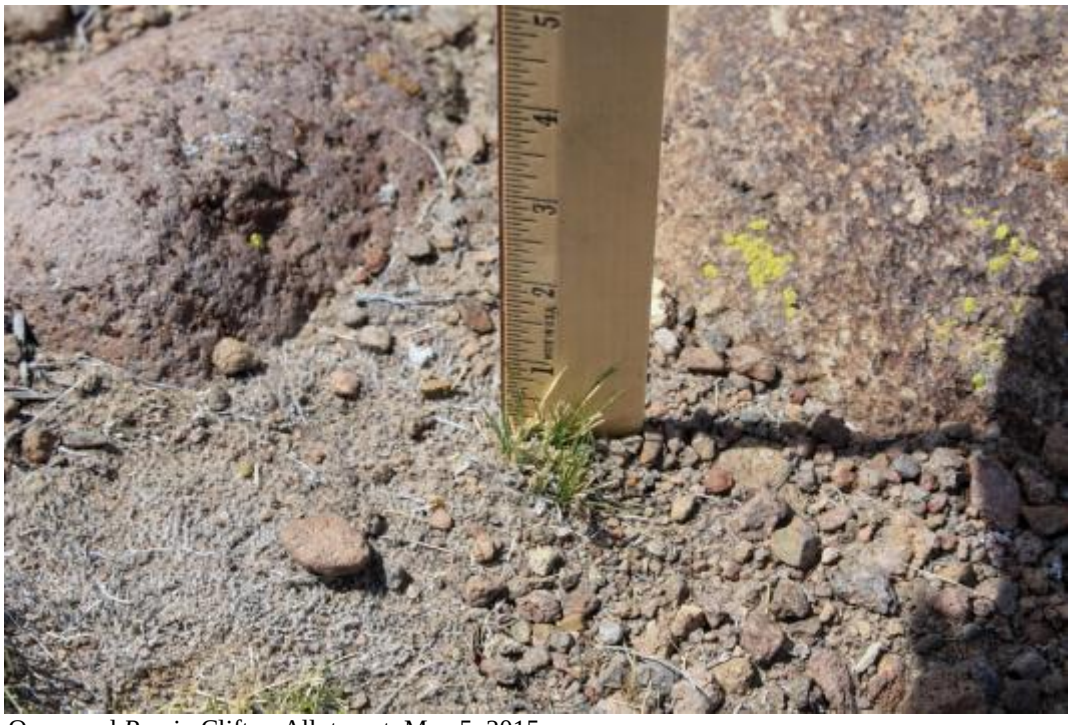
Over used needlegrass in Clifton Allotment July 21, 2015.



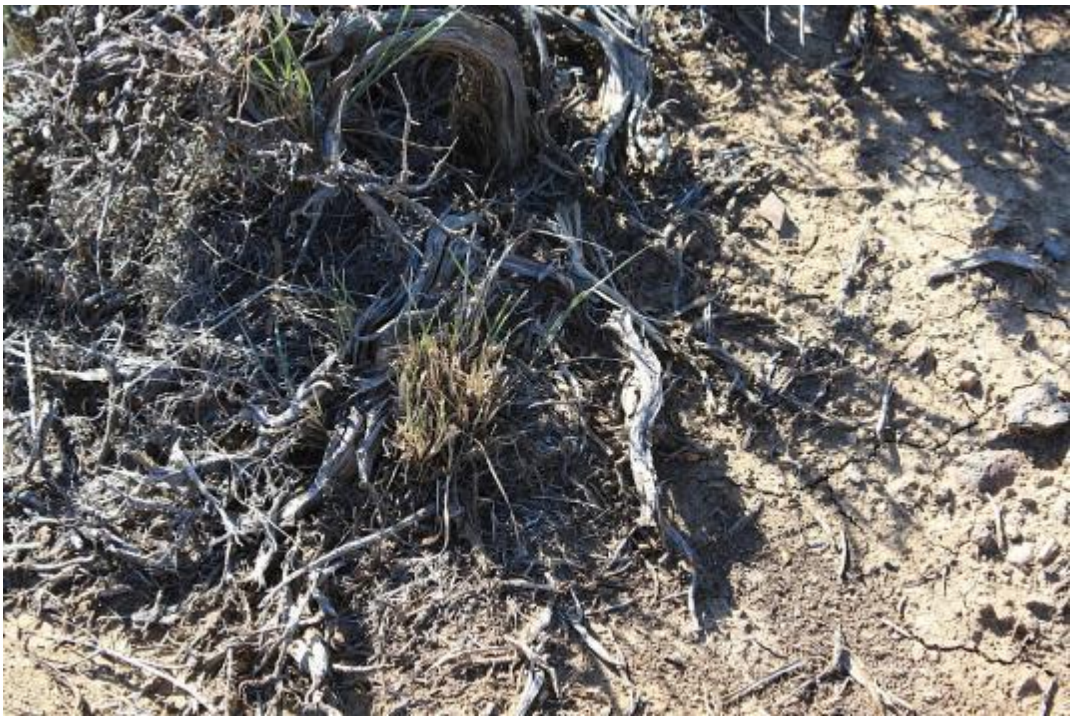
Protected needlegrass, adjacent to the over used needlegrass (above), Clifton Allotment July 21, 2015.



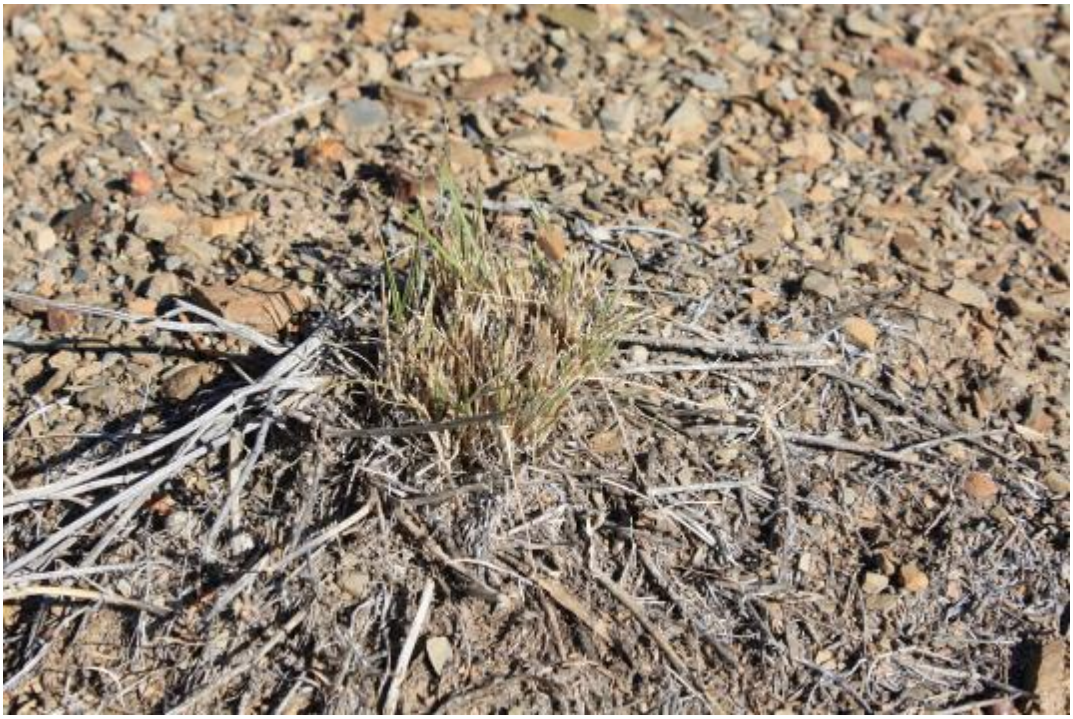
Over used needlegrass in Clifton Allotment March 19, 2015



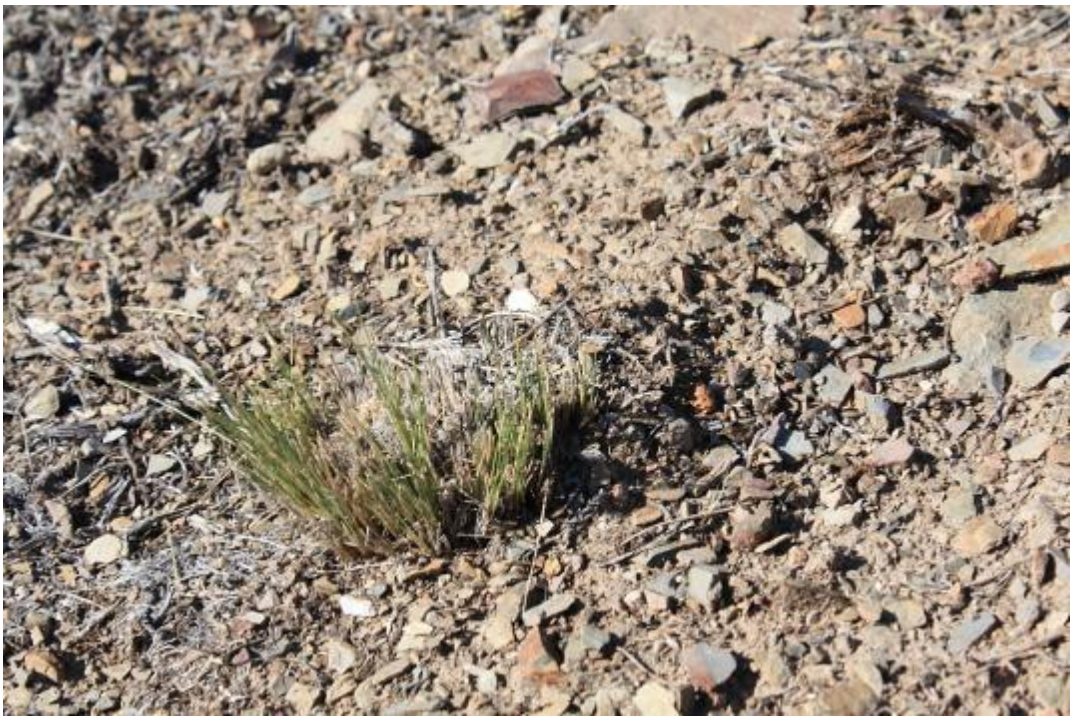
Over used *Poa* in Clifton Allotment, May 5, 2015.



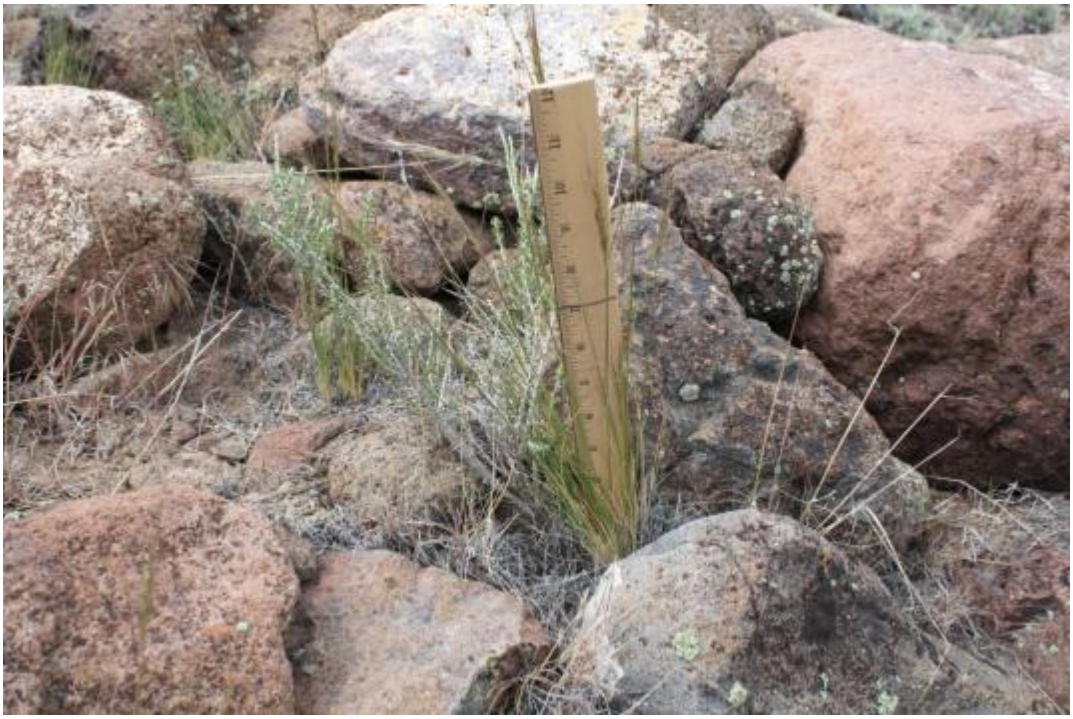
Over utilized Indian rice grass, the sagebrush branches afforded it a little protection, Hackett Canyon Allotment, July 6, 2015.



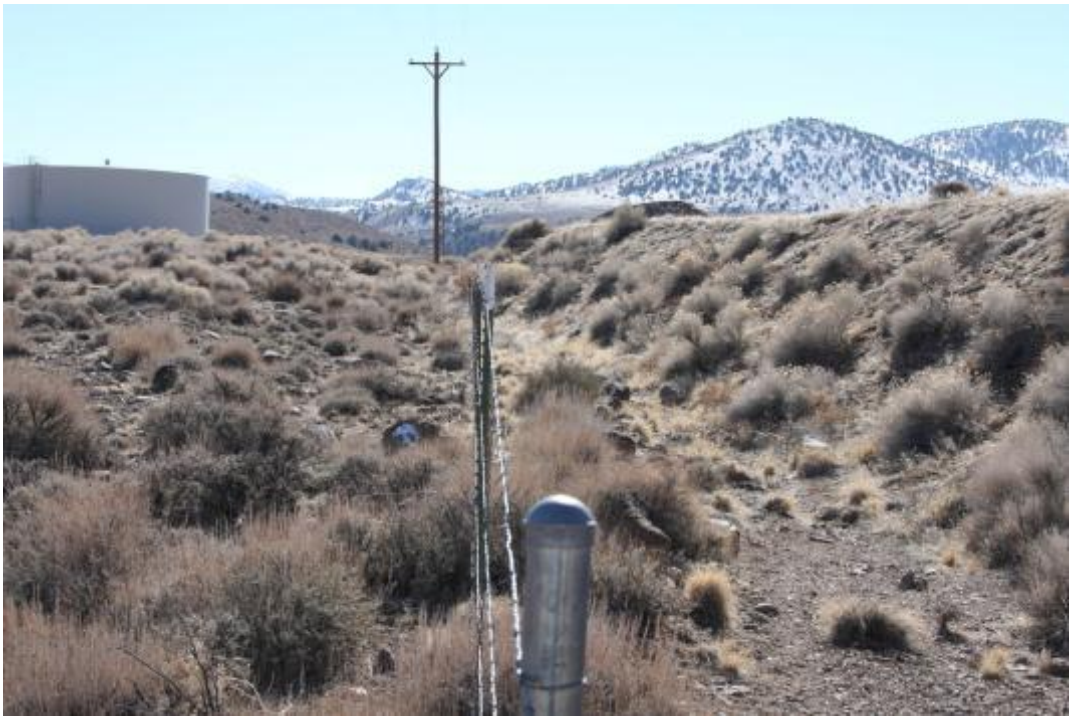
Over utilized needlegrass in Hackett Canyon Allotment, July 6, 2015.



Over utilized needlegrass in Hackett Canyon Allotment, July 6, 2015.



Semi-protected needlegrass in Eldorado Canyon Allotment, May 14, 2015.



Fence line contrast Eldorado Canyon Allotment, February 2, 2014. The ungrazed area to the right has abundant healthy bunch grass plants, the area to the left has no plants.